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URS OPERATING SERVICES

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DENVER, COLORADO 80202-1908
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September 22, 2011

Ms. Sabrina Forrest
U.S. Environmental Protection Agency, Region 8
Mail Code: 8EPR-B
1595 Wynkoop Street
Denver, Colorado 80202-1129

**SUBJECT: START 3, EPA Region 8, Contract No. EP-W-05-050, TDD No. 1008-13
Trip Report for August 2011 Sampling and Field Activities, Upper Animas Mining
District, Silverton, San Juan County, Colorado**

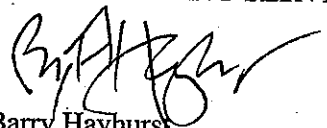
Dear Ms. Forrest:

Attached is one copy of the draft trip report for sampling and field activities conducted for the Upper Animas Mining District Site Reassessment. Activities included surface water, sediment, and soil sampling. Field activities were conducted the week of August 22, 2011 and included source sample collection from the Gold King 7 Level Mine waste rock pile and calculation of the waste pile volume, evaluation of mineralogy in source waste rock piles, documentation of the surface water pathway from all identified sources, field documentation of fishing along the Animas River south of Silverton, and wetlands delineation and sensitive environment characterization on Cement Creek. This document is submitted for your review and comments.

If you have any questions, please call me at 303-291-8270.

Sincerely,

URS OPERATING SERVICES, INC.


Barry Hayhurst
Environmental Scientist

cc: Megan Adamczyk, Project Manager
Charles W. Baker/UOS (w/o attachment)
File/UOS

EPA ACTION BLOCK	
<input type="radio"/>	Approved
<input type="radio"/>	Approved, TDD to follow
<input type="radio"/>	Approved as corrected
<input type="radio"/>	Disapproved
<input type="radio"/>	Review with _____
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Date _____ By _____	

TRIP REPORT
Upper Animas Mining District
Silverton, San Juan County, Colorado

1.0 INTRODUCTION

URS Operating Services, Inc. (UOS), was tasked by the Environmental Protection Agency (EPA), under Superfund Technical Assessment and Response Team 3 (START) contract # EP-W-05-050 Technical Direction Document (TDD) No. 1008-13, to conduct a site reassessment (SR) at the Upper Animas Mining District site. Specifically, START was tasked to collect additional samples and surface water pathway documentation in August 2011. These field activities were conducted in accordance with the approved Addendum to the approved Field Sampling Plan (FSP) – Supplemental Sampling (UOS 2011a).

Four source soil samples were collected from the Gold King 7 Level Mine waste rock pile and submitted for contract laboratory program (CLP) analysis for total target analyte list (TAL) metals. The results are presented in Table 1, and Laboratory Form 1s are presented in Appendix B. Geographic positioning system (GPS) coordinates were collected to estimate a volume for the waste pile. In addition, the mineralogy of the waste rock piles at the identified sources at the Grand Mogul Mine, Mogul Mine, Red and Bonita Mine, and Gold King 7 Level Mine was characterized to determine if sufficient similarities existed to group the four sources together.

The surface water pathways from each of the sources at Grand Mogul Mine, Mogul Mine, Red and Bonita Mine, Gold King 7 Level Mine, and American Tunnel were documented. The results for the survey are presented in this report and illustrated in Figure 1 and the Photolog attached in Appendix A.

Fishing along the Animas River downstream of the confluence of Cement Creek with the Animas River was investigated along the 15-mile target distance limit (TDL) as far as Elk Park, and the results are presented in this report and the Photolog attached in Appendix A.

Wetlands delineation and sensitive environment characterization along Cement Creek between the Grand Mogul Mine and Ohio Gulch were conducted by experts, and a report of the results is included in the Wetlands Delineation and Sensitive Environment Characterization Report attached in Appendix C.

A copy of the field logbook is included as Appendix D.

2.0 BACKGROUND

The site is located in Silverton, San Juan County, Colorado and is made up of publically and privately owned parcels. The investigation focused on the Animas River between U.S. Geological Survey (USGS) gauging stations A72 and A68, Mineral Creek immediately upstream of the Animas River, Cement Creek, and tributaries to Cement Creek (Figure 1) (UOS 2010).

Mines in the Silverton area operated between the years 1874 and 1991. Mining activities in the Upper Animas basin, including Cement Creek, produced the waste rock and mill tailings sources from which contamination spread throughout the surface water pathway. This site assessment focused on Cement Creek, a major source of metals contamination to the Animas River.

Thirty-three individual sources of mine wastes have been identified in the Cement Creek drainage, totaling approximately 188,000 cubic yards (UOS 2009). Several investigations have been conducted in the Cement Creek basin by the Colorado Department of Public Health and the Environment (CDPHE), but data were not appropriate for evaluating the site based on Hazard Ranking system (HRS) criteria. Several sources of mine waste have been reclaimed to some degree through work carried out by the Bureau of Land Management (BLM), the CDPHE, the Colorado Division of Reclamation Mining and Safety (DRMS), and the Animas River Stakeholders Group (ARSG). The reclaimed waste areas are primarily in gulches that feed into lower Cement Creek. Most of the sources of mine wastes in the Upper Cement Creek basin remain in place. The wastes are rich in arsenic, cadmium, copper, lead, manganese, and zinc.

During the October 2010 sampling event, START collected adit discharge and adit sediment samples from all of the five identified adit sources and waste rock samples from waste rock piles of three of the identified sources (Grand Mogul, Mogul, and Red and Bonita mines). Environmental samples of surface water and sediment were also collected from Cement Creek and used to characterize the impact of these sources on Cement Creek, and also the impact of Cement Creek on the Animas River.

During the August 2011 field effort, data gaps identified in the Analytical Results Report (ARR) of the 2010 site reassessment were addressed. These activities included the collection of samples of the Gold King 7 Level Mine waste rock pile and collection of GPS data to calculate a volume of the waste rock pile; comparison of mineralogy of the waste rock at the four source areas with waste rock piles; documentation of the surface water pathway from each of the five sources to the probable point of entry

(PPE) into Cement Creek; delineation of wetlands and characterization of sensitive environments along Cement Creek; and documentation of fishing activity along the Animas River south of Silverton.

The purpose of these supplemental field activities was to assist Region 8 EPA personnel in gathering data to determine whether this site should be considered for National Priority List (NPL) listing.

3.0 SITE ACTIVITIES

START members Barry Hayhurst and Jeff Miller mobilized to Silverton, Colorado on August 21, 2011. Field activities began on Monday, August 22, 2011 and included:

- Wetlands delineation and sensitive environment characterization of Cement Creek between the Grand Mogul Mine and Ohio Gulch;
- Collection of four soil/source samples from the waste rock pile at the Gold King 7 Level Mine;
- Collection of GPS coordinates to calculate a volume for the Gold King 7 Level Mine waste rock pile;
- Characterization of mineralization and documentation of similarity of mineralogy to determine if all identified sources could be combined as a single source;
- Documentation of the surface water pathway from all the sources identified in the 2010 field sampling event; and
- Field documentation of fishing activity along the Animas River to the 15-mile TDL downstream of the confluence of Cement Creek with the Animas River;

The Photolog of site activities is provided in Appendix A.

3.1 SAMPLING AND ANALYSIS

Source/soil samples were collected for TAL total metals analysis. All of the source/soil samples were collected in accordance with procedures described in UOS TSOP 4.16, "Surface and Shallow Depth Soil Sampling" (UOS 2005). Dedicated, disposable plastic scoops were used for source sample collection. All source samples were collected as biased grab samples from the 6- to 12-inch depth interval. A sharp shooter shovel was used to accomplish the depth needed for the sample and was decontaminated between samples. Soil samples for total metals analysis were placed in 8-ounce high density polyethylene (HDPE) jars. All samples were labeled with the sample identification number and stored in a cooler on ice pending shipping to the laboratory.

Sample descriptions were logged in the field log book. A GPS point and photograph were collected for each sample location.

The Gold King 7 Level Mine waste rock pile was first screened using a Innov-X Systems Model OSD-4000 portable X-ray fluorescence (XRF) instrument (Appendix A, Photo 8). Twelve field readings identified three different types of mine waste rock:

- a medium-grained orange colored material,
- a fine-grained limonite colored material, and
- a fine-to-coarse grained material with large concentrations of quartz and sulfides.

Four samples of the waste rock pile at the Gold King 7 Level Mine were collected in accordance with the approved FSP. Sample UASO015 was collected from an area that was being actively eroded by the North Fork of Cement Creek, from material that appeared to be similar to the fine-grained limonite colored material (Appendix A, Photo 7). START personnel also collected source/soil samples from each of the three types of waste material identified with the field XRF. One Matrix Spike/Matrix Spike Duplicate (MS/MSD) sample was collected with the sample from location UASO018.

Soil samples for TAL total metals analysis were shipped via FedEx to Sentinel Inc. in Huntsville, Alabama where they were received in good condition with custody seals intact.

Sample results are shown in Table 1 and sample locations are shown in Figure 1.

3.2 CALCULATION OF VOLUME OF GOLD KING 7 LEVEL MINE WASTE ROCK PILE

GIS coordinates were collected to calculate the volume of the Gold King 7 Level Mine waste rock pile. The dimensions collected were a flat area on top of the waste rock pile measuring approximately 60 feet by 100 feet, a waste rock pile height of approximately 70 feet with a slope of approximately 32 degrees and, a lower dimension greater than 220 feet with a feather thin layer of waste rock less than 1 foot thick. Converting these dimensions to a slab averaging 30 feet thick, 70 feet wide, and 160 feet long $[(100 + 220)/2]$ the volume of the waste rock pile is estimated to be a minimum of 12,500 cubic yards.

3.3 MINERALOGICAL COMPARISON

The mineralogy of quartz-sulfide ore was found in all the mine waste rock dumps at the Grand Mogul, Mogul, Red and Bonita, and Gold King 7 Level mines. This observation conforms to the geologic description of the ores found in the USGS Professional Paper 1651, Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado, Chapters E-1 Geologic Framework and E-3 Major Styles of Mineralization and Hydrothermal Alteration and Related Solid- and Aqueous-Phase Geochemical Signatures (USGS 2007).

3.4 DOCUMENTATION OF SURFACE WATER PATHWAY

The surface water overland flow pathway from each of the five identified sources was documented in the field by walking the distance from the adit discharge to the PPE. All mine wastes that come into contact with surface water were documented, and Figure 1 was prepared showing all source samples and the PPE to Cement Creek from each source.

- **Grand Mogul Mine:** The overland flow pathway for the Grand Mogul Mine begins at the western toe of the main waste rock pile and continues westward for approximately 300 feet until it enters Cement Creek (Appendix A, Photos 1 & 2). The overland flow path as shown in Photo 1 is heavily stained with iron oxides (that begin to precipitate out of solution when the pH rises above 3.5) as compared to the stream course of Cement Creek on the left center of the photograph.
- **Mogul Mine:** The discharge from the Mogul exits through an adit on the northeast side of the waste rock pile and flows across the top of the waste rock pile in a tarp lined ditch to the access road. Once the adit discharge crosses the road, it flows over a mixture of mine waste rock and mine trash into a series of wetlands below the mine (Appendix A, Photo 3). The overland flow pathway from the Mogul Mine covers approximately 1,200 feet before the PPE into Cement Creek. It can be observed that iron oxides are precipitating on the side of Cement Creek where discharge water from the Mogul Mine is entering Cement Creek (Appendix A, Photo 4).
- **Red and Bonita Mine:** The discharge from the Red and Bonita Mine exits from an adit on top of the mine waste rock pile and flows over the waste rock pile to a ditch between the base of the mine waste rock pile and an access road to the south end of the waste rock pile where it flows southward, then into a culvert directed westward under the

road, and then directly westward across a barren iron oxide stained landscape to Cement Creek (Appendix A, Photo 5). The overland flow path after flowing under the road splits into two streams in the barren area after the road and before entering Cement Creek. The more upstream flow path was visually estimated to carry approximately 75 percent of the flow, and the smaller stream enters Cement Creek approximately 50 feet downstream of the larger stream. Photo 6 shows the upper dominant discharge point. Note the iron oxide staining in the Cement Creek streambed on the side of the PPE from the Red and Bonita Mine (Appendix A, Photo 6).

The surface of the Red and Bonita waste rock pile has been covered with an armor of iron oxides that have cemented the surface material together. It is unknown if the armor prevents percolation of water through the waste rock pile.

- **Gold King 7 Level Mine:** There are two adit discharges at the top of the Gold King 7 Level Mine waste rock pile. The main discharge on the east side of the pile is channelized into a segmented plastic channel to flow down to the North Fork of Cement Creek just beyond the east side of the waste rock pile. The smaller western discharge is not provided with any engineering controls and flows westward eventually percolating through the waste rock pile into the North Fork of Cement Creek. The North Fork of Cement Creek is actively eroding the mine waste rock pile, and evidence of small sloughing and erosional rills were observed in the waste rock pile (Appendix A, Photo 7). The North Fork of Cement Creek flows approximately 1,500 feet westward from the toe of the Gold King 7 Level Mine waste rock pile to the PPE with Cement Creek. Iron oxide precipitation in the Cement Creek streambed below the confluence of Cement Creek and the North Fork of Cement Creek is pronounced (Appendix A, Photo 9).
- **American Tunnel:** The discharge point for the American Tunnel is found just upstream of Gladstone where the discharge emerges from the diversion structure and flows approximately 200 feet westward to its PPE with Cement Creek. Strong iron oxide precipitate staining of the discharge and Cement Creek below the PPE was observed in August 2011 (Appendix A, Photo 10).

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3.5 WETLANDS DELINEATION AND SENSITIVE ENVIRONMENT CHARACTERIZATION

A team of experts delineated streamside wetlands that conformed to the definition of 40 CFR 230.3 along Cement Creek from the Grand Mogul Mine downstream to Ohio Gulch. The expert team also evaluated the stretch of Cement Creek between the Grand Mogul Mine and Ohio Gulch for sensitive environments and threatened and endangered species applicable to the HRS scoring of the site. The team identified four segments of continuous stream side wetlands totaling 0.1 mile or longer and numerous shorter segments. These four large segments total 3,542 feet or 0.67 mile. One of the wetlands segments (WL10-1) was directly below the Mogul Mine and impacted only by the Mogul Mine. Segment WL10-1 is measured to be 1,062 feet of streamside wetlands. The other three segments are located below the five identified source areas and total 0.47 mile in length. Twelve additional smaller wetlands segments totaling 3,757 feet (0.7 mile) were also delineated. The total of documented wetlands on Cement Creek between the Grand Mogul Mine and Ohio Gulch is 1.37 miles. No sensitive environments or threatened and endangered species directly associated with Cement Creek were documented during the field study. The results of this investigation are presented in Appendix C of this report.

3.6 INVESTIGATION OF FISHING ALONG THE ANIMAS RIVER SOUTH OF SILVERTON, COLORADO

START investigated the potential fishing activity along the Animas River downstream of the confluence of Cement Creek with the Animas River, south of Silverton, Colorado. Elk Park, an open area in the Animas River Canyon where the State of Colorado performs fish count studies every 5 years, was investigated. A fishing lure was found in a tree along the river bank, but no fishermen were observed during the investigation (Appendix A, Photos 11 and 12).

Frank Cianci, a conductor on the Durango and Silverton Narrow Gauge Railroad for the past 21 years, recounted that once he dropped off a family in Elk Park who planned to fish there. Mr. Cianci also related that he had seen people fishing along the stretch of the Animas River between Silverton and Elk Park five or six times (UOS 2011b [Appendix D]). The Durango and Silverton Narrow Gauge Railroad regularly stops in Elk Park for fishermen and campers.

Ron Dewitz and volunteer with the Forest Service Public Land Center in Silverton related that he occasionally heard of someone catching a fish on the Animas River south of Silverton, but he did

not personally know anyone who had caught a fish in that stretch of the river (UOS 2011b [Appendix D]).

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4.0 LIST OF REFERENCES

URS Operating Services, Inc. (UOS). 2005. "Technical Standard Operating Procedures for the Superfund Technical Assessment and Response Team (START), EPA Region 8." September 2005.

URS Operating Services, Inc. (UOS). 2009. "Data Gap Analysis Report for Targeted National Priority Listing: Upper Animas Mining District San Juan County Colorado." October 13, 2009.

URS Operating Services, Inc. (UOS). 2010. "Field Sampling Plan: Upper Animas Mining District San Juan County Colorado." October 21, 2010.

URS Operating Services, Inc. (UOS). 2011a. "Addendum to the approved Field Sampling Plan-Supplemental Sampling: Upper Animas Mining District San Juan County Colorado." August 18, 2011.

URS Operating Services, Inc. (UOS). 2011b. Upper Animas-Cement Creek Field Work-August, 2011. Field notebook by B. Hayhurst. August 2011.

U.S. Geological Survey Professional Paper 1651. 2007. Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado. 2007.

Table 1
Gold King 7 Level Mine Waste Rock Source/Soil Samples

Field Sample ID: Location:	Superfund Chemical Data Matrix (SCDM) Soil Exposure Pathway NCRSC (mg/kg)	Superfund Chemical Data Matrix (SCDM) Soil Exposure Pathway CRSC (mg/kg)	UASO015 MH30H7 Gold King 7 Level Mine waste pile being eroded by North Fork Cement Creek (mg/kg)	UASO016 MH30H8 Gold King 7 Level Mine orange limonite-stained waste rock (mg/kg)	UASO017 MH30H9 Gold King 7 Level Mine yellow limonite-stained medium- to fine- grained waste rock (mg/kg)	UASO018 MH30J0 Gold King 7 Level Mine medium- to coarse-grained white quartz and sulfides MS/MSD (mg/kg)
Aluminum	–	–	1190	1970	1010	1010
Antimony	31	–	3.8 J	1.6 J	3.6 J	3.5 J
Arsenic	23	0.43	16.8	18.1	7.5	4.7
Barium	5,500	–	34.1	115	28.4	23.8
Beryllium	160	–	0.060 J	0.077 J	0.083 J	0.060 J
Cadmium	39	–	0.35 J	1.4	0.43 J	0.83
Calcium	–	–	195 J	126 J	133 J	110 J
Chromium	230	–	0.77 J	1.8	0.64 J	0.50 J
Cobalt	–	–	0.35 J	1.0 J	1.1 J	0.29 J
Copper	–	–	47.5	67.2	84.2	192
Iron	–	–	13100	32900	11300	9680
Lead	–	–	773	1250	1500	454
Magnesium	–	–	282 J	397 J	146 J	313 J
Manganese	11,000	–	69.6	171	91.2	49
Nickel	1600	–	0.46 J	0.76 J	0.80 J	0.25 J
Potassium	–	–	973	3320	844	810
Selenium	390	–	2.5 J	8.1	1.9 J	2.1 J

Table 1
Gold King 7 Level Mine Waste Rock Source/Soil Samples

Field Sample ID: Location:	Superfund Chemical Data Matrix (SCDM) Soil Exposure Pathway NCRSC	Superfund Chemical Data Matrix (SCDM) Soil Exposure Pathway CRSC	UASO015 MH30H7 Gold King 7 Level Mine waste pile being eroded by North Fork Cement Creek	UASO016 MH30H8 Gold King 7 Level Mine orange limonite-stained waste rock	UASO017 MH30H9 Gold King 7 Level Mine yellow limonite-stained medium- to fine- grained waste rock	UASO018 MH30J0 Gold King 7 Level Mine medium- to coarse-grained white quartz and sulfides MS/MSD
Analytes	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Silver	390	–	6.7	5.8	10.1	7.3
Sodium	–	–	161 J	196 J	173 J	140 J
Thallium	–	–	2.8 U	2.8 U	2.7 U	2.7 U
Vanadium	550	–	6.7	11.2	5.6	2.9 J
Zinc	23,000	–	45	399	89.3	186

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
 U The analyte was not detected at or above the Contract Required Detection Limit (CRDL).
 NCRSC Non Cancer Risk Screening Concentration
 CRSC Cancer Risk Screening Concentration
 mg/kg milligrams per kilograms
BOLD Greater than SCDM benchmark

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APPENDIX A

**Photo Log
Cement Creek
San Juan County, Colorado
August 2011**



PHOTO 1

View to the west of surface water flowing from the toe of the Grand Mogul Mine waste rock dumps toward Cement Creek. Note iron staining of flow path.

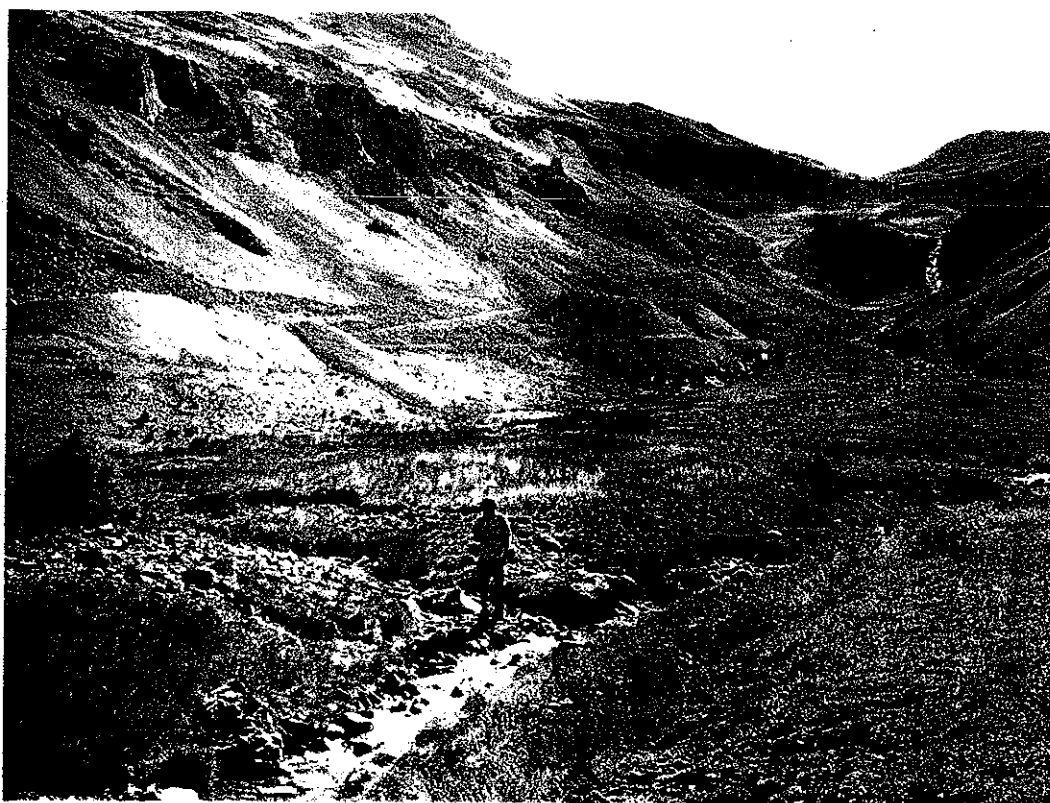


PHOTO 2

View to the east of the PPE from the Grand Mogul Mine into Cement Creek. Note iron staining of rocks in Cement Creek downstream of flow from Grand Mogul Mine. J. Miller of START at PPE collecting GPS location data.

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PHOTO 3

View to the southwest showing adit discharge water from the Mogul Mine flowing over mine waste rock into wetlands immediately downstream of Mogul Mine waste rock. Note the mix of scrap lumber and waste rock. Note staining of flow path into wetlands. Cement Creek is at the shallow part of the valley in the background.

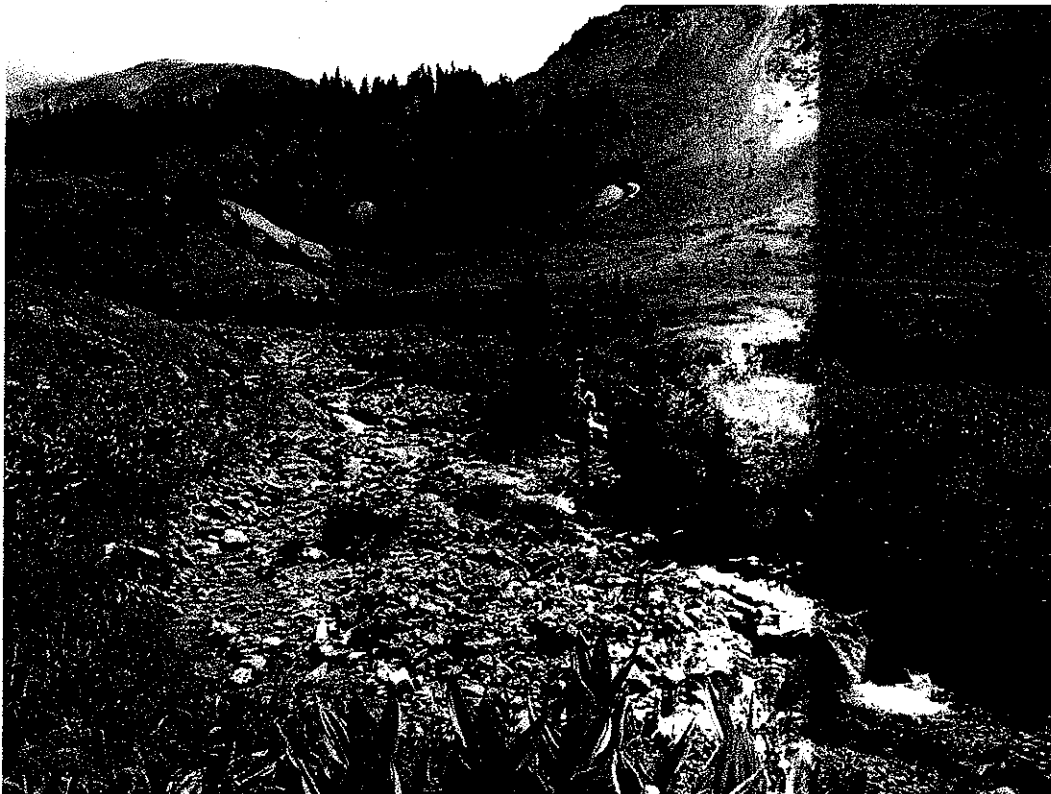


PHOTO 4

View to the east of the PPE of the discharge from the Mogul Mine into Cement Creek. The surface water pathway from the adit flows down to the road on the other side of the white patch of waste rock and through the wetlands. Note iron staining of Cement Creek on the inflow side of the creek from the PPE where J. Miller of START at PPE collecting GPS location data.

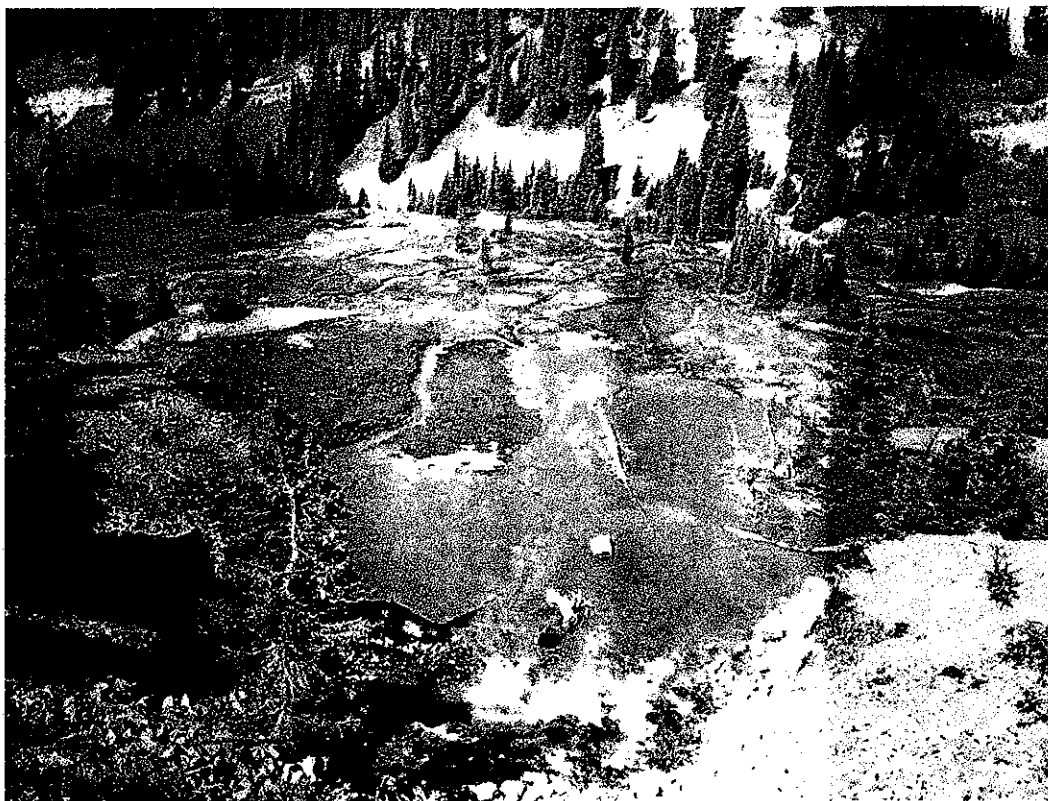


PHOTO 5

View to the west of the adit discharge from the Red and Bonita Mine. Note the strong color of iron oxide precipitation and the staining to Cement Creek along valley floor.



PHOTO 6

PPE from the adit discharge at the Red and Bonita Mine to Cement Creek. Note iron oxide staining on the same side of the Cement Creek as the PPE discharge point. J. Miller of START at PPE collecting GPS location data.



PHOTO 7

Gold King 7 Level Mine waste rock pile being eroded by the North Fork of Cement Creek. Note the erosion rills on the waste rock pile and undercutting by stream. J. Miller of START collects source sample UASO015 GPS coordinates.

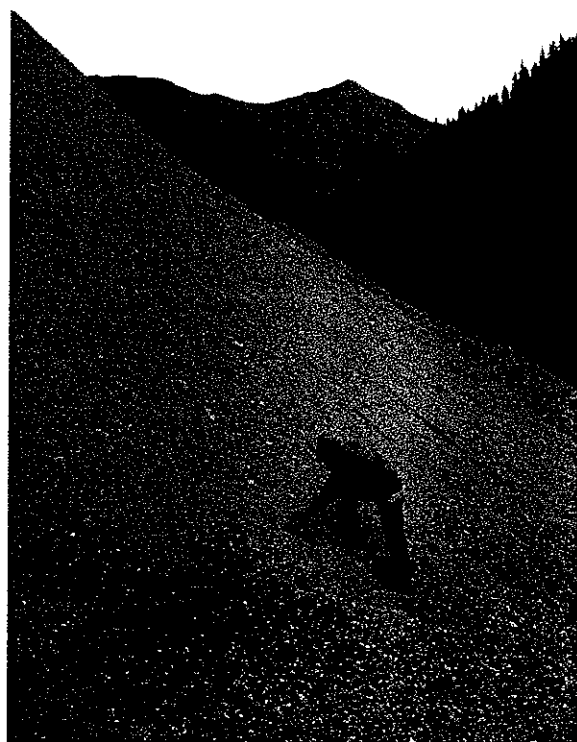


PHOTO 8

Gold King 7 Level Mine waste rock pile. J. Miller of START collecting field XRF data from sample location UASO019.

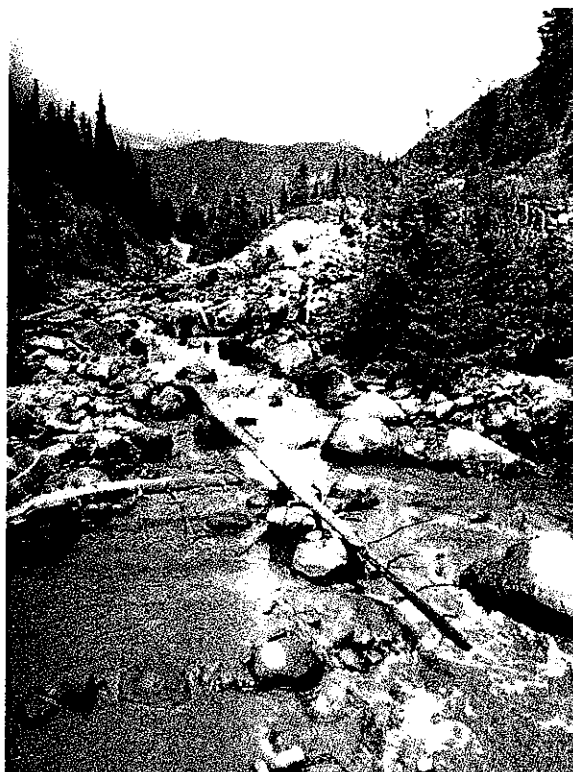


PHOTO 9

Cement Creek immediately downstream of confluence with N. Fork of Cement Creek draining from Gold King 7 Level Mine. J. Miller of START at PPE collecting GPS coordinates.



PHOTO 10

PPE from the American Tunnel outlet entering into Cement Creek. Note strong iron oxide staining downstream of PPE.



PHOTO 11

Elk Park is an open area in the Animas River Canyon below Silverton where the State of Colorado conducts electroshocking and passengers from the Durango & Silverton Narrow Gauge Railroad are dropped off to fish the Animas River. Access is also gained from Molas Lake via the Colorado Trail which crosses the Animas River in Elk Park.



PHOTO 12

A fishing lure found imbedded on a tree limb along the banks of the Animas River in Elk Park. Lure is bright green on larger limb near the trunk.

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APPENDIX B

Laboratory Form I Data Sheets and Chain of Custody Form

CASE # 41730

START, Denver, CO

EPA Contract Number: EP-W-05-050

CHAIN OF CUSTODY RECORD

Site #: 36548983

Contact Name: Barry Hayhurst

Contact Phone: 303-291-8270

No: 085M-09/01/11-0008

Lab: Sentinel Inc.

Lab Contact: Attn: Beverly Kilgore

Lab Phone: 2565349800

[illegible]

Special Instructions: Case is Complete

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

Temp Blank = 6.9°C

2/6

[illegible]

7-126
2/17/14

000027

COVER PAGE

Lab Name: Sentinel

Contract: EPW09040

Lab Code: SENTIN Case No.: 41730

Mod. Ref. No.

SDG No.: MH30H7

SOW No.: ISM01.2

EPA SAMPLE NO.

MH30H7

MH30H8

MH30H9

MH30J0

MH30J0D

MH30J0S

Lab Sample ID.

16155

16156

16157

16158

16158S2

16158MS

ICP-AES ICP-MS

Were ICP-AES and ICP-MS interelement
corrections applied?

(Yes/No) YES

Were ICP-AES and ICP-MS background corrections
applied?

(Yes/No) YES

If yes-were raw data generated before
application of background corrections?

(Yes/No) YES

The laboratory did not receive any instructions with this SDG to modify the SOW standard laboratory sample preparation procedures (e.g., subsampling). To aid in the determination of data usability with respect to project decisions, any modifications performed are described below.

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:

Date:

Name:

Title:

1A-IN
 INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH30H7

Lab Name: Sentinel

Contract: EPW09040

Lab Code: SENTIN Case No.: 41730

Mod. Ref. No.

SDG No.: MH30H7

Matrix: (soil/water) SOIL

Lab Sample ID: 16155

% Solids: 90.0

Date Received: 09/02/2011

Concentration Units (ug/L, ug, or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1190		*E	P
7440-36-0	Antimony	3.8	J	NE	P
7440-38-2	Arsenic	16.8			P
7440-39-3	Barium	34.1		E	P
7440-41-7	Beryllium	0.060	J		P
7440-43-9	Cadmium	0.35	J	*	P
7440-70-2	Calcium	195	J		P
7440-47-3	Chromium	0.77	J		P
7440-48-4	Cobalt	0.35	J		P
7440-50-8	Copper	47.5		N*E	P
7439-89-6	Iron	13100		E	P
7439-92-1	Lead	773		*E	P
7439-95-4	Magnesium	282	J	E	P
7439-96-5	Manganese	69.6		NE	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	0.46	J		P
7440-09-7	Potassium	973		E	P
7782-49-2	Selenium	2.5	J		P
7440-22-4	Silver	6.7		N*E	P
7440-23-5	Sodium	161	J		P
7440-28-0	Thallium	2.8	U	N	P
7440-62-2	Vanadium	6.7			P
7440-66-6	Zinc	45.0		N*E	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts:

Comments:

USEPA - CLP

1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

000025

MH30H8

Lab Name: Sentinel

Contract: EPW09040

Lab Code: SENTIN Case No.: 41730

Mod. Ref. No.

SDG No.: MH30H7

Matrix: (soil/water) SOIL

Lab Sample ID: 16156

% Solids: 90.7

Date Received: 09/02/2011

Concentration Units (ug/L, ug, or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1970		*E	P
7440-36-0	Antimony	1.6	J	NE	P
7440-38-2	Arsenic	18.1			P
7440-39-3	Barium	115		E	P
7440-41-7	Beryllium	0.077	J		P
7440-43-9	Cadmium	1.4		*	P
7440-70-2	Calcium	126	J		P
7440-47-3	Chromium	1.8			P
7440-48-4	Cobalt	1.0	J		P
7440-50-8	Copper	67.2		N*E	P
7439-89-6	Iron	32900		ED	P
7439-92-1	Lead	1250		*ED	P
7439-95-4	Magnesium	397	J	E	P
7439-96-5	Manganese	171		NE	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	0.76	J		P
7440-09-7	Potassium	3320		E	P
7782-49-2	Selenium	8.1			P
7440-22-4	Silver	5.8		N*E	P
7440-23-5	Sodium	196	J		P
7440-28-0	Thallium	2.8	U	N	P
7440-62-2	Vanadium	11.2			P
7440-66-6	Zinc	399		N*E	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts:

Comments:

FORM IA-IN

ISM01.2 (1/10)

8/7/11
10-924

1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH30H9

Lab Name: Sentinel

Contract: EPW09040

Lab Code: SENTIN Case No.: 41730

Mod. Ref. No.

SDG No.: MH30H7

Matrix: (soil/water) SOIL

Lab Sample ID: 16157

% Solids: 92.0

Date Received: 09/02/2011

Concentration Units (ug/L, ug, or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1010		*E	P
7440-36-0	Antimony	3.6	J	NE	P
7440-38-2	Arsenic	7.5			P
7440-39-3	Barium	28.4		E	P
7440-41-7	Beryllium	0.083	J		P
7440-43-9	Cadmium	0.43	J	*	P
7440-70-2	Calcium	133	J		P
7440-47-3	Chromium	0.64	J		P
7440-48-4	Cobalt	1.1	J		P
7440-50-8	Copper	84.2		N*E	P
7439-89-6	Iron	11300		E	P
7439-92-1	Lead	1500		*ED	P
7439-95-4	Magnesium	146	J	E	P
7439-96-5	Manganese	91.2		NE	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	0.80	J		P
7440-09-7	Potassium	844		E	P
7782-49-2	Selenium	1.9	J		P
7440-22-4	Silver	10.1		N*E	P
7440-23-5	Sodium	173	J		P
7440-28-0	Thallium	2.7	U	N	P
7440-62-2	Vanadium	5.6			P
7440-66-6	Zinc	89.3		N*E	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts:

Comments:

USEPA - CLP

1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

000027

MH30J0

Lab Name: Sentinel

Contract: EPW09040

Lab Code: SENTIN Case No.: 41730

Mod. Ref. No.

SDG No.: MH30H7

Matrix: (soil/water) SOIL

Lab Sample ID: 16158

% Solids: 93.2

Date Received: 09/02/2011

Concentration Units (ug/L, ug, or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1010		*E	P
7440-36-0	Antimony	3.5	J	NE	P
7440-38-2	Arsenic	4.7			P
7440-39-3	Barium	23.8		E	P
7440-41-7	Beryllium	0.060	J		P
7440-43-9	Cadmium	0.83		*	P
7440-70-2	Calcium	110	J		P
7440-47-3	Chromium	0.50	J		P
7440-48-4	Cobalt	0.29	J		P
7440-50-8	Copper	192		N*E	P
7439-89-6	Iron	9680		E	P
7439-92-1	Lead	454		*E	P
7439-95-4	Magnesium	313	J	E	P
7439-96-5	Manganese	49.0		NE	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	0.25	J		P
7440-09-7	Potassium	810		E	P
7782-49-2	Selenium	2.1	J		P
7440-22-4	Silver	7.3		N*E	P
7440-23-5	Sodium	140	J		P
7440-28-0	Thallium	2.7	U	N	P
7440-62-2	Vanadium	2.9	J		P
7440-66-6	Zinc	186		N*E	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts:

Comments:

FORM IA-IN

ISM01.2 (1/10)

8/7/11
12-026

APPENDIX C

Cement Creek Wetland Delineations and Sensitive Habitat Assessments

September 6, 2011

Barry Hayhurst
URS Operating Systems
1099 18th Street, Suite 710
Denver, Colorado

Subject: Preliminary Results – EPA Cement Creek Wetland Delineations and Sensitive Habitat Assessments

Dear Mr. Hayhurst;

URS has completed the field surveys for wetlands and sensitive habitats on Cement Creek. This letter includes the results of those surveys. Preliminary figures overlain on topographic maps and aerial photographs are attached. The information provided does not include a detailed methodology, individual wetland data forms, or other supporting documentation. All information relevant to the Project will be included in the full report.

Summary

A total of four wetlands with streamside lengths greater than 0.10 mile (528 linear feet) were delineated within the Project. One of these wetlands occurs directly below the Mogul Mine point Source. Three of the wetlands occur below all point sources.

The Cement Creek study area does not contain any sensitive habitats or species that are closely associated with the stream. Several sensitive habitats and species are known to occur along Cement Creek but are primarily supported by groundwater (fens and iron fens), or adjacent forested habitat (Canada lynx, *Lynx canadensis*). One rare moss (*Sphagnum obtusum*) has been reported from near the study area at Gladstone, but was not observed in the study area.

Wetlands

Methods

Wetland delineations along Cement Creek were conducted by URS certified wetland delineators between August 22 and August 27, 2011. Wetlands were identified within 10 feet of the Ordinary High Water Mark of Cement Creek on properties with previously granted access (study area).

Under the Environmental Protection Agency Hazard Ranking System (HRS), only wetlands with hydrophytic vegetative characteristics that span greater than 0.10 mile (528 linear feet) along the creek channel qualify for consideration. These aquatic features must be wetlands that also meet the United States Corps of Engineers definition of a wetland as stated in 40 CFR 230.3. For the

purposes of this survey, wetlands with over 200 feet of continuous stream frontage were formally delineated. Shorter or patchy wetland fringes can also be considered qualitatively under the HRS; therefore, the locations and approximate lengths of all wetlands observed within the study area were noted on field maps.

Wetlands were identified in the field as areas having positive evidence of three environmental parameters: hydric soils, wetland hydrology, and hydrophytic vegetation. Wetlands were formally delineated using the Routine Determination protocol (Environmental Laboratory 1987), the *USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coasts Region Version 2.0* (Environmental Laboratory 2008), and the minimum requirements for wetland delineations in the USACE Sacramento District (USACE 2001).

Results

A total of four wetlands that qualify under the HRS wetland stream length criteria were delineated within the study area. These include WL 2-1 (Map 1), WL 2-2 (Map 1), WL 3-3 (Maps 1 and 2), and WL 10-1 (Map 9). The shortest of these is WL 2-2 (590 feet or 0.11 mile) and the longest is WL 10-1 (1,062 linear feet or 0.20 mile). The aggregate total of all HRS qualifying wetlands is 3,542 linear feet, or 0.67 mile.

A total of five point source contamination areas were emphasized in the survey. These include the Grand Mogul, the North Mogul, the Mogul, the Red and Bonita, and the Upper Gold King mines. Wetland 10-1 occurs directly below the Mogul Mine Point Source. WL 2-1, WL2-2, and WL3-3 occur below all point sources.

Non-qualifying wetlands delineated on Cement Creek include 3,757 linear feet (0.70 mile) along the stream bank. These wetlands occur as fringes in areas where channel banks are fragmented by steep slopes, deposition, or by natural/manmade disturbance. WL9-1 and 9-2 (Map 8) are an example of this types of wetland fringe.

Table 1 includes the lengths of all formally delineated wetlands with streamside lengths of greater than 0.10 mile. Table 2 includes total lengths of all other delineated wetlands.

Table 1
HRS Qualifying Wetlands on Cement Creek

Name	Length of Longest Segment (linear feet)	Miles	Meets HRS Criteria
WL 2-1	938	0.18	Yes
WL 2-2	590	0.11	Yes
WL 3-3A	461	0.09	Yes - Continuous with WL3-3B
WL 3-3B	491	0.09	Yes - Continuous with

Name	Length of Longest Segment (linear feet)	Miles	Meets HRS Criteria
			WL3-3A
WL10-1	1,062	0.20	Yes
Total HRS Qualifying Wetlands	3,542	0.67	

Table 2
Wetlands Delineated on Cement Creek Greater Than 200 Linear Feet

Name	Length of Longest Segment (linear feet)	Miles	Meets HRS Criteria
WL 3-1	266	0.05	No
WL 3-2W	153	0.03	No
WL 3-4	384	0.07	No
WL 3-5	245	0.05	No
WL 4-1	229	0.04	No
WL 4-2	396	0.07	No
WL 4-3	360	0.07	No
WL 4-4	323	0.06	No
WL 5-1	232	0.04	No
WL 5-2	257	0.05	No
WL 9-1	419	0.08	No
WL 9-2	493	0.09	No
Total Other Delineated Wetlands	3,757	0.70	

Sensitive Species and Habitats

Methods

Field surveys to evaluate the presence of sensitive habitats and species were conducted from August 22 to 29, 2011. The study area extended along Cement Creek and included the adjacent valley floor and lower slopes and point sources including Grand Mogul, North Mogul, Mogul, Red and Bonita, and Upper Gold King mines. The study area included public lands managed by BLM and areas of private land where access had been obtained. Survey techniques included walking the study area, observations of plant and animal species, and mapping of habitats. Numerous photographs were taken, and soil composition in potential fen areas was assessed using shovel tests. Prior to the field survey, available information on potential rare and sensitive species and habitats was obtained from the Colorado Natural Heritage Program, U.S. Fish and

Wildlife Service (USFWS), Colorado Parks and Wildlife, Colorado Natural Diversity Information Source, and San Juan Public Lands (BLM).

Fens

Seventeen fens were found within the study area, and several additional fens were observed in adjacent areas of private land that were not included in the study area. Fens are wetlands that primarily have saturated organic soils (peat or muck) and hydrology provided by groundwater. They are considered regionally important because they take thousands of years to develop, are generally not replaceable, and have important hydrological and water quality functions (USFWS 1999). They are protected under guidance and regulations of federal land management agencies, USFWS, U.S. Army Corps of Engineers, and U.S. Environmental Protection Agency.

Because fens are primarily supported by groundwater, they occur above the stream ordinary high water mark and unlikely to be influenced by normal stream flows. Where they border the stream, there can be wetlands adjacent to the stream supported hydrologically by both stream flow and seepage from the fen. However, it was observed that these streamside wetlands have mineral soils from sediment deposition during high flows. Where organic soils extend to the stream edge, there is usually a drop-off of 2 feet or more between the bottom of the fen and the edge of the stream.

Although stream flow does not appear to influence fens that are adjacent to it, discharge from mines on the valley slopes does affect several fens that are located between the mine and Cement Creek. Fens that are influenced by mine discharge including those below the Mogul Mine, Adams Mine, and Red and Bonita Mines. There are areas of deposited sediment within the Mogul Mine fen, but water from mine discharge appears to intermingle with other sources of water extending over about 60% of the fen. Below the other two sites, there are areas of live fen interspersed with large areas of bare organic and mineral soils. Much of the bare area appears to be former fen. Mine discharge appears to have reduced the size of the fens by erosion, alteration of hydrology (due to flows being diverted to the eroded bare areas), and potentially by toxic discharges.

Iron Fens

According to the Colorado Natural Heritage Program, iron fens have only been reported in Colorado. Iron fens are unique in that they have acidic water, high ion concentrations, and feature limonite (bog iron) terraces. Of the 15 iron fens in Colorado, 5 are located in San Juan County. The CNHP considers all of Cement Creek valley floor from near Gladstone to below Topeka Gulch to be part of the Cement Creek Iron Fen Potential Conservation Area, with the most prominent examples present at Tiger Gulch and Topeka Gulch. The Tiger Gulch site is on private land outside the study area, but was observable from the road and extends into the study area; while the Topeka Gulch site appears to be on private land and not visible from the road. Six of the fens in the study area had limonite ledges and/or red sediments, and additional iron fens were observed from the road at several locations on private lands outside of the study area. Iron fens with limonite terraces are shown on the figures. Like other fens in the Cement Creek Valley, iron fens are supported by groundwater and do not appear to be supported by stream

flow. Where they are located adjacent to streams, there are limonite terraces and aprons with seepage toward the stream, along with extensive areas of moss and small amounts of sedges (*Carex* sp.) and other wetland vegetation.

Canada lynx

Canada lynx is a federally threatened species. The Cement Creek Valley is located within the San Juan Mountains core area, where Colorado Parks and Wildlife began releasing lynx in 1999 with the hope of reestablishing a population. Canada lynx occur primarily in subalpine forests, and riparian areas are considered to be secondary habitat. Open areas such as subalpine meadows do not directly support Canada lynx. Some of the wetlands along Cement Creek may be used by lynx but are probably relatively unimportant for lynx survival. Wetlands most likely to be used have high shrub cover and are adjacent to large areas of forest or shrub habitat. Wetlands with low shrub cover and that are adjacent to subalpine meadows are less likely to be used. The wetlands immediately adjacent to Cement Creek occupy a very small area relative to the home ranges of individual lynx. While lynx are likely to occur in the study area, water quality in Cement Creek and its adjacent wetlands does not appear to be a significant factor in their occurrence or habitat quality.

Other Threatened, Endangered or Sensitive Species

In addition to Canada lynx, there are seven other federally listed or candidate endangered or threatened species that may occur or be affected by activities in San Juan County. None of them are expected to occur in the Cement Creek study area. The study area has no habitat for yellow-billed cuckoo (*Coccyzus americanus*) or Umcompahgre fritillary butterfly (*Boloria acrocnema*), and the study area is outside the range of the Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). There is suitable habitat for southwestern willow flycatcher (*Empidonax traillii extimus*), but there are no records of this species in or near the study area, and it primarily occurs at lower elevations. Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) occur downstream of Cement Creek in the San Juan River, but not within or near the study area. Wolverine (*Gulo gulo*), a candidate species could occur at higher elevations in the watershed but are not known to be present in the San Juan Mountains.

Colorado Parks and Wildlife has a list of state endangered, threatened or special concern species, some of which are the same as the federal list. Several of these species have a low potential for occurrence in the Cement Creek study area and were not observed during the field survey, including boreal toad (*Bufo boreas boreas*), northern leopard frog (*Rana pipiens*), American peregrine falcon (*Falco peregrinus anatum*), and Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). There are no records of boreal toad or northern leopard frog in the study area. Cement Creek is identified as historic habitat for Colorado River cutthroat trout in a range-wide status review (Hirsch et al 2005).

Several BLM sensitive species may occur in the study area but were not observed. Northern goshawk (*Accipiter gentilis*) occurs in upland conifer and aspen forests, and is not likely to regularly occur along the creek. Black swift (*Cypseloides niger*) nests at waterfalls and forages high in the air and has no nexus with Cement Creek. Three sensitive plant species have a low

potential for occurrence and were not observed in the study area, including green sedge (*Carex viridula*), slender rock-brake (*Cryptogramma stelleri*), and slender cottongrass (*Eriophorum gracile*). Green sedge and slender cottongrass occur in fens, while slender rock-brake is associated with cliffs and waterfalls. The habitats in which these species occur do not have an important nexus with the creek and its adjacent wetlands.

In 2003, the Colorado Natural Heritage Program and Colorado State University produced the San Juan County Biological Assessment, which addresses natural communities, rare and imperiled plants and animals, and identifies potential conservation areas. The study area includes only one plant community that is considered to be rare in this document, (*Picea engelmannii*)/*Betula glandulosa*/*Carex aquatilis*/*Sphagnum angustifolium* (iron fen), which is discussed above. None of the rare and imperiled plant species addressed in this document were observed and most occur in habitats that are not present along Cement Creek and its adjacent wetlands. One rare and imperiled animal species, boreal owl (*Aegolius funereus*), is likely to occur in forests in the Cement Creek Valley but would not be specifically be associated with the creek or its wetlands.

The EPA provided the location of a sphagnum moss *Sphagnum obtusum* that was recently found by Rodney Chimner near Gladstone. *Sphagnum obtusum* has not previously been found in Colorado and is not included in the recently published *Bryophytes of Colorado: Mosses, Liverworts and Hornworts* (Weber and Wittman, 2007). It occurs primarily in Canada. The site reported by Chimner is a fen upgradient from the North Fork of Cement Creek. This site was visited by URS during the field survey to gain a search image for this species. The only sphagnum species observed in the study area was *Sphagnum angustifolium*, which was present in many of the fens, and *Sphagnum fimbriata*, which was observed along a portion of Cement Creek above Gladstone. Neither of these species is considered sensitive.

The full report will be issued by October 15, 2011. If you have any questions regarding information presented in this preliminary report, or need additional information, please contact me at 303-330-3819 or by e-mail at Susan_Hall@URSCorp.com.

Sincerely,

URS Corporation

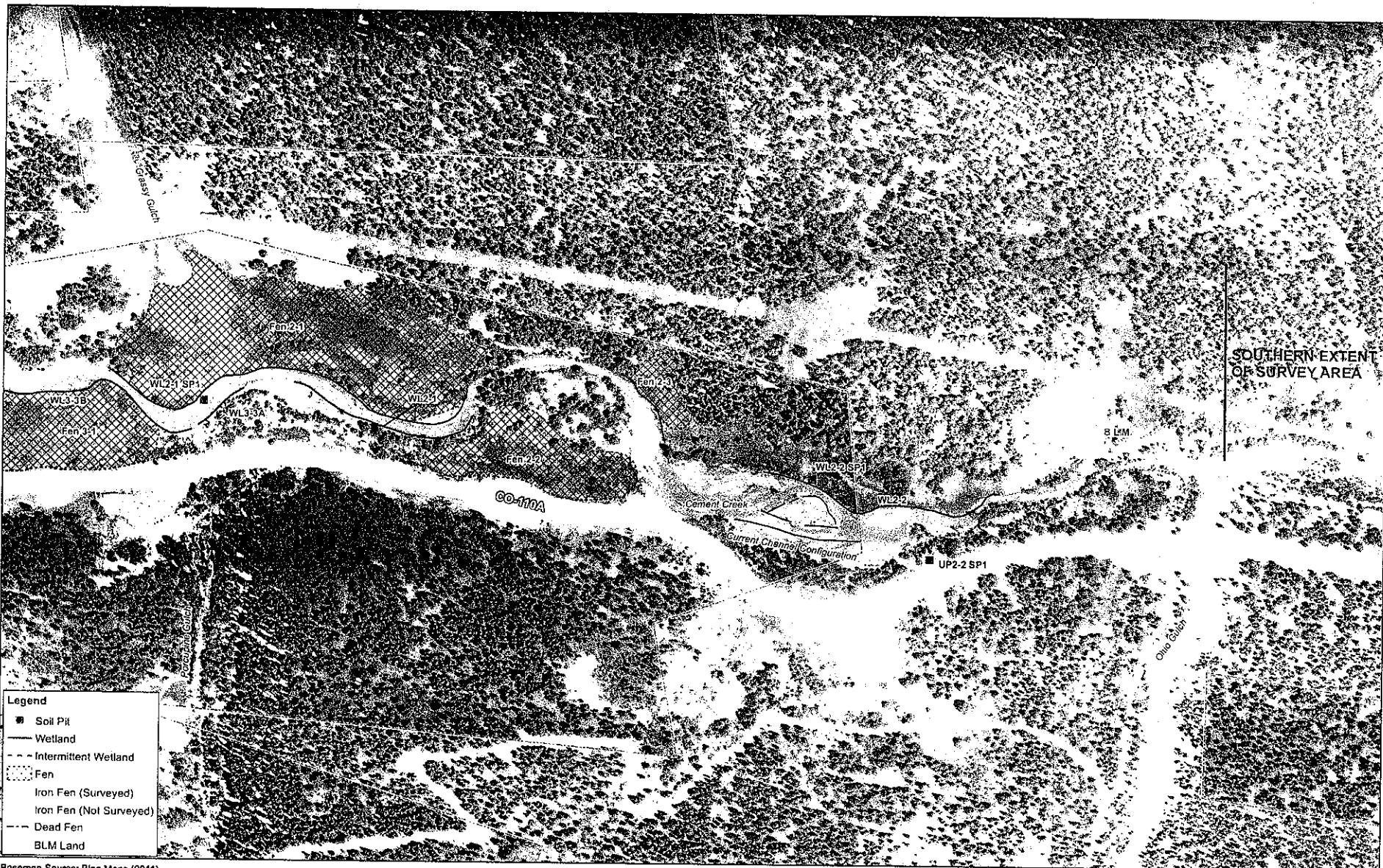
Susan Hall
Senior Ecologist

Attachments

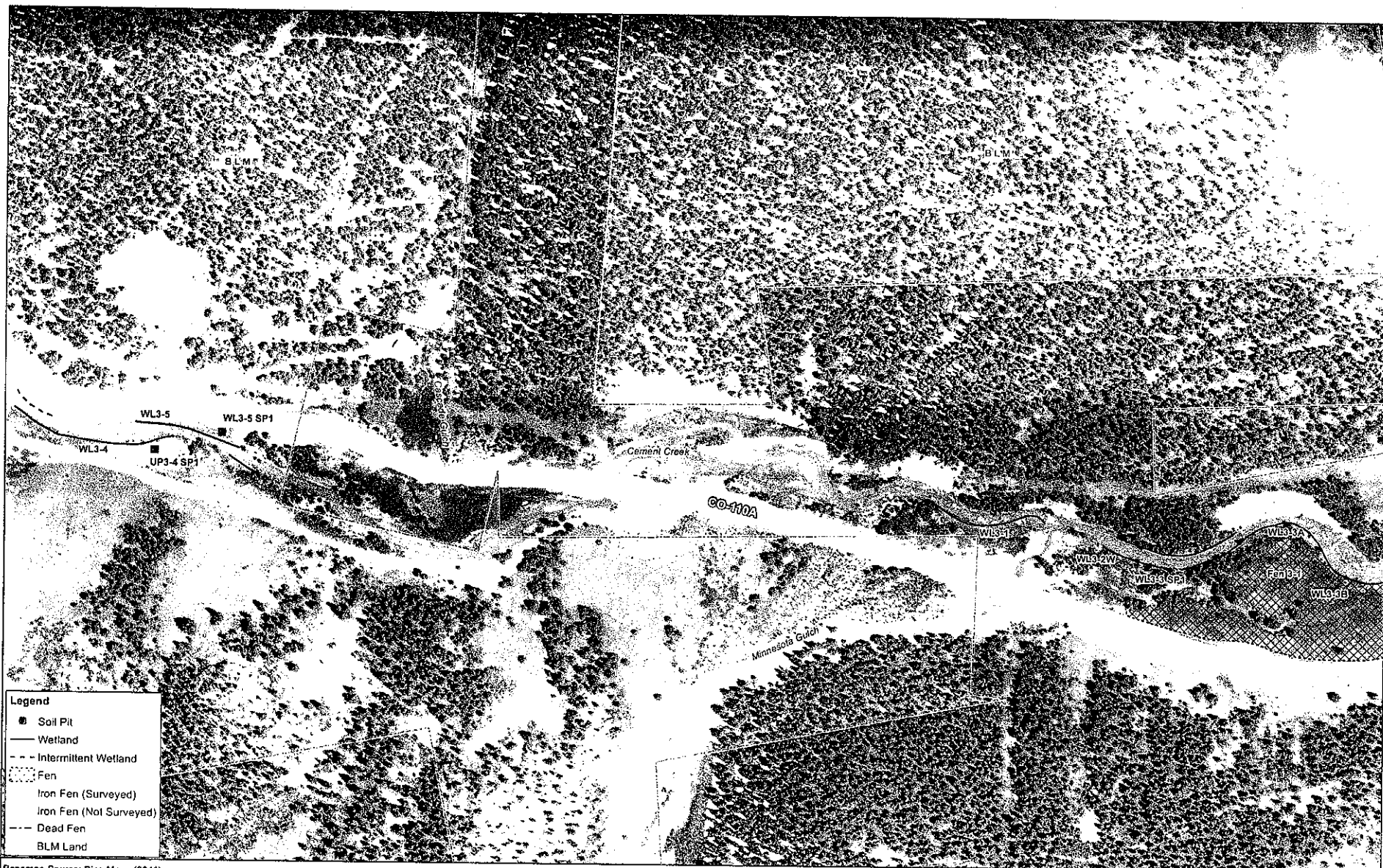
Attachment A – Figures

Enclosures

GIS Data provided electronically



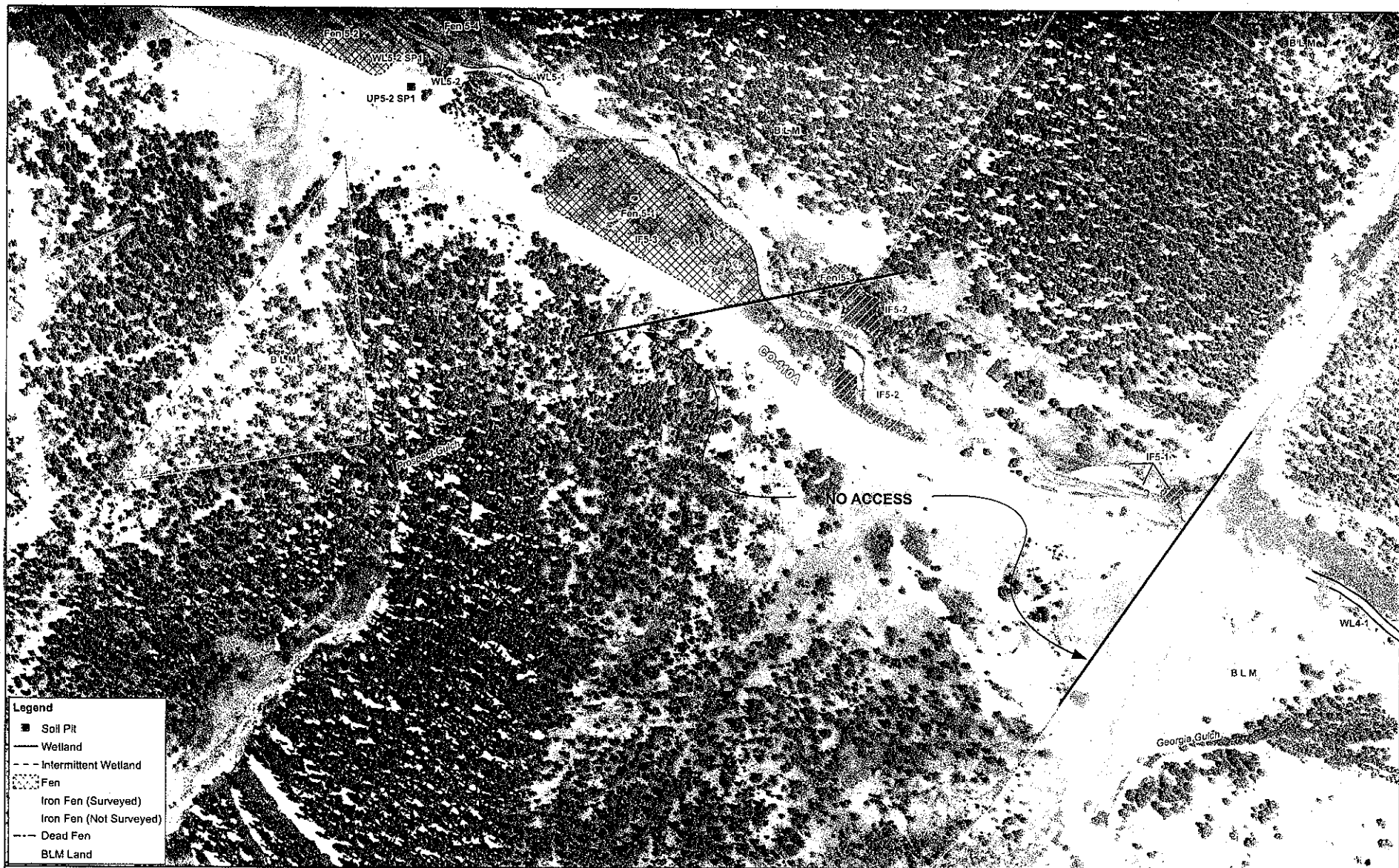
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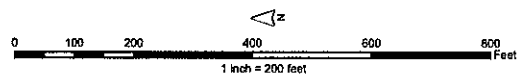
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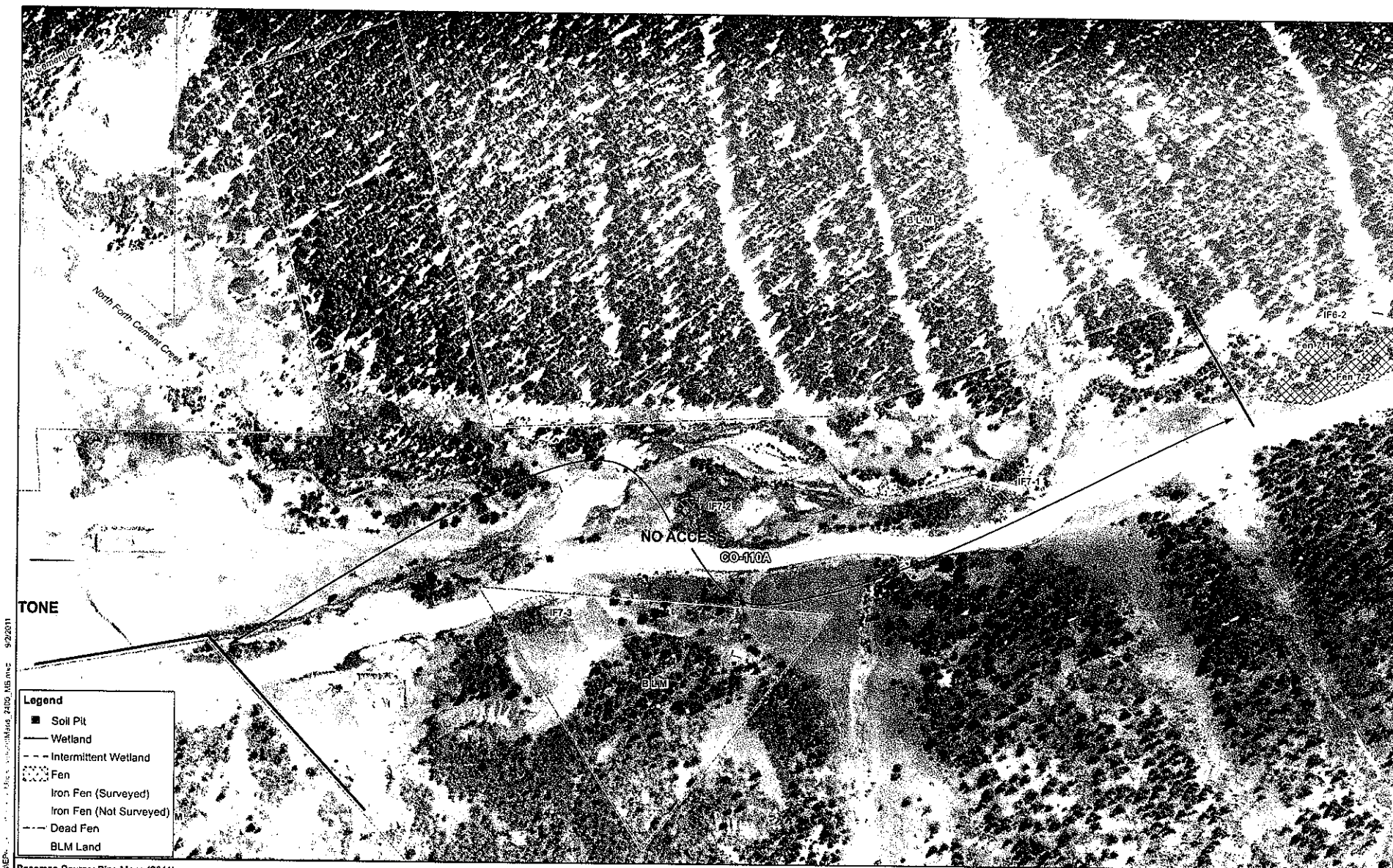
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 - Wetland
 - - - Intermittent Wetland
 - ▨ Fen
 - ▨ Iron Fen (Surveyed)
 - ▨ Iron Fen (Not Surveyed)
 - - - Dead Fen
 - BLM Land

Basemap Source: Bing Maps (2011)



PRELIMINARY DRAFT
MAP 4 of 15

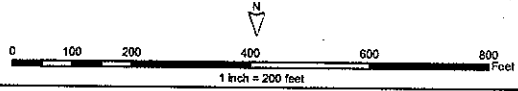
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9/2/2011
Map 6 of 10
Map 6 of 10
Map 6 of 10

- Legend**
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 - Iron Fen (Surveyed)
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 - - - Dead Fen
 - BLM Land

Basemap Source: Bing Maps (2011)



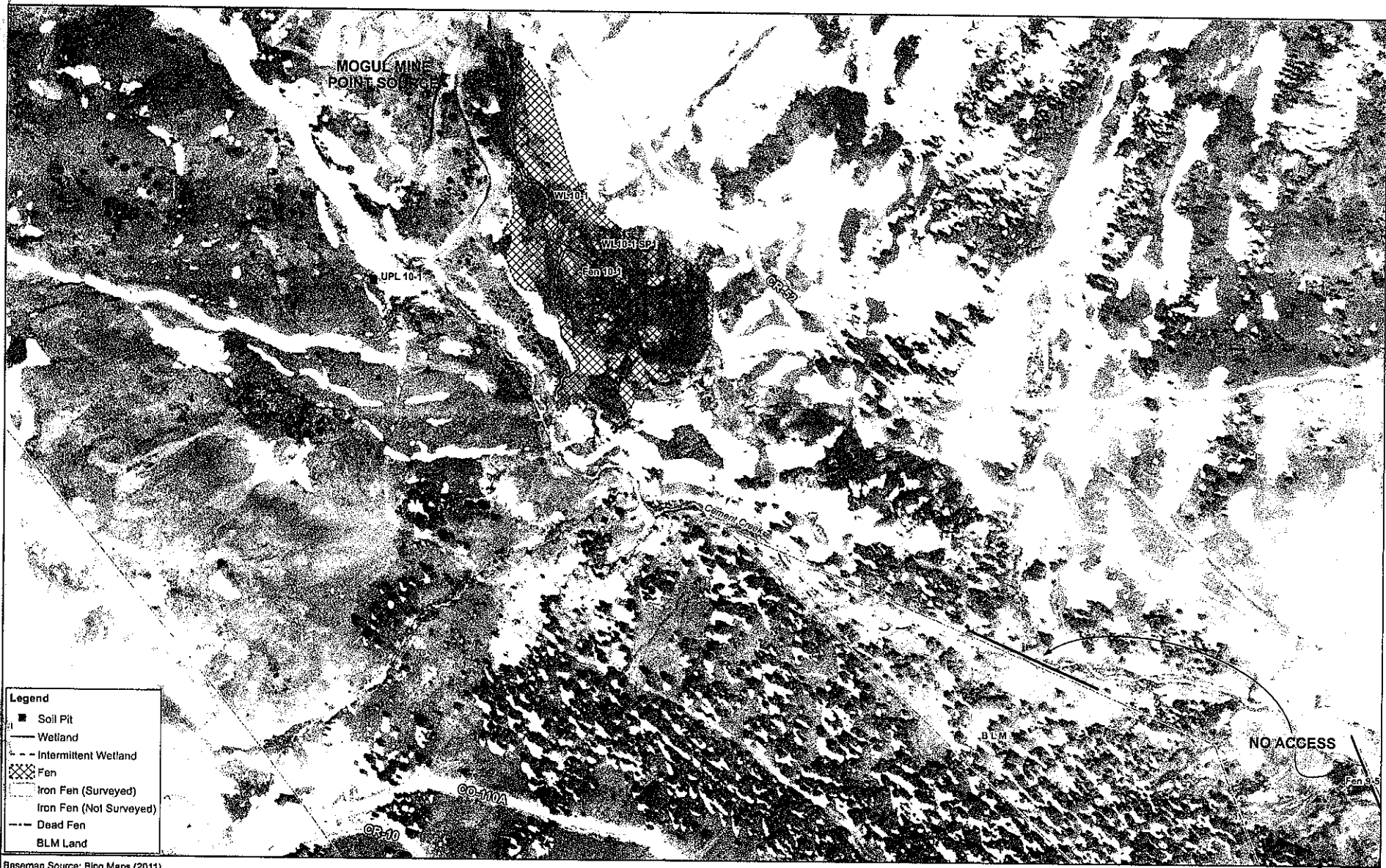
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MAP 6 of 10

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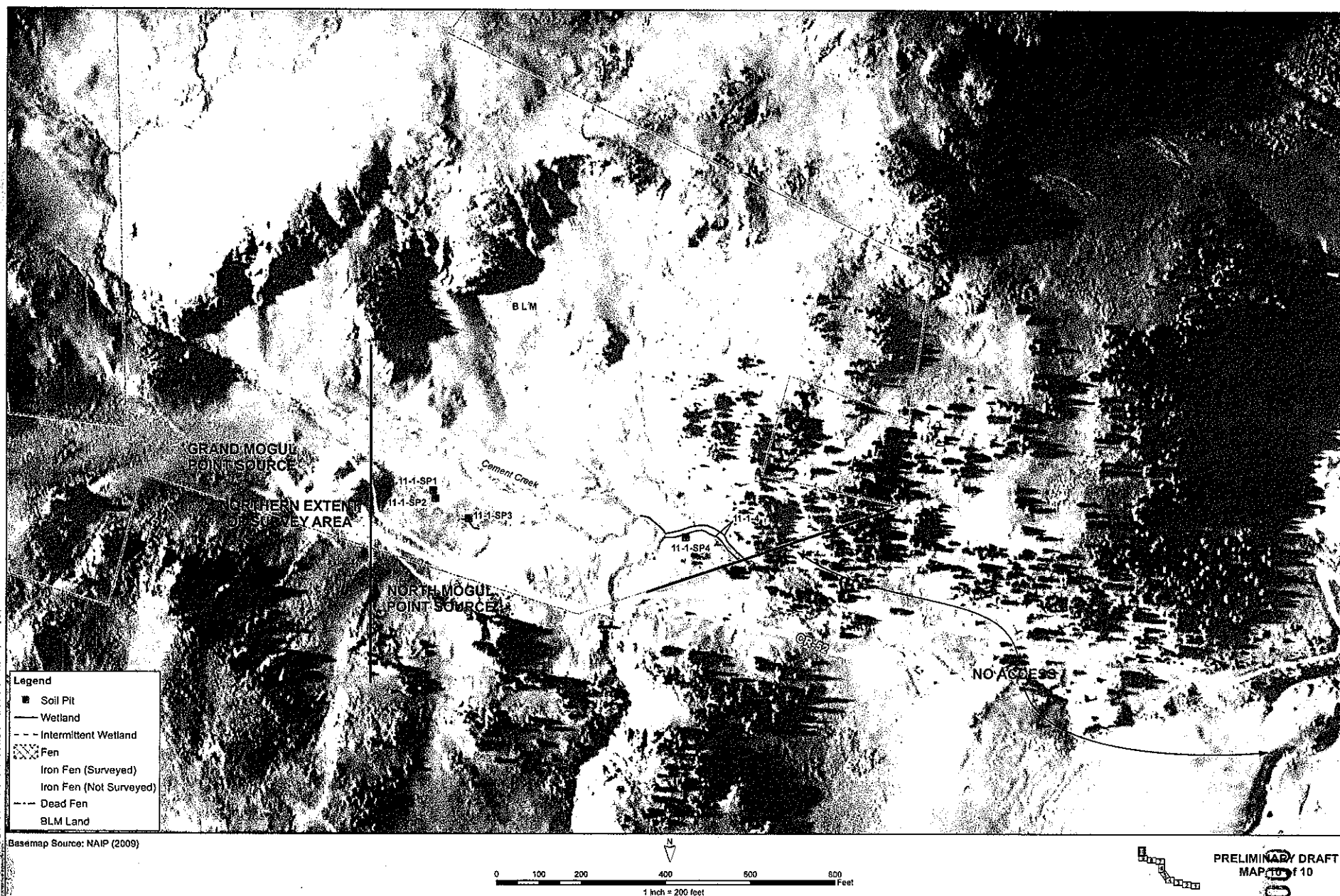


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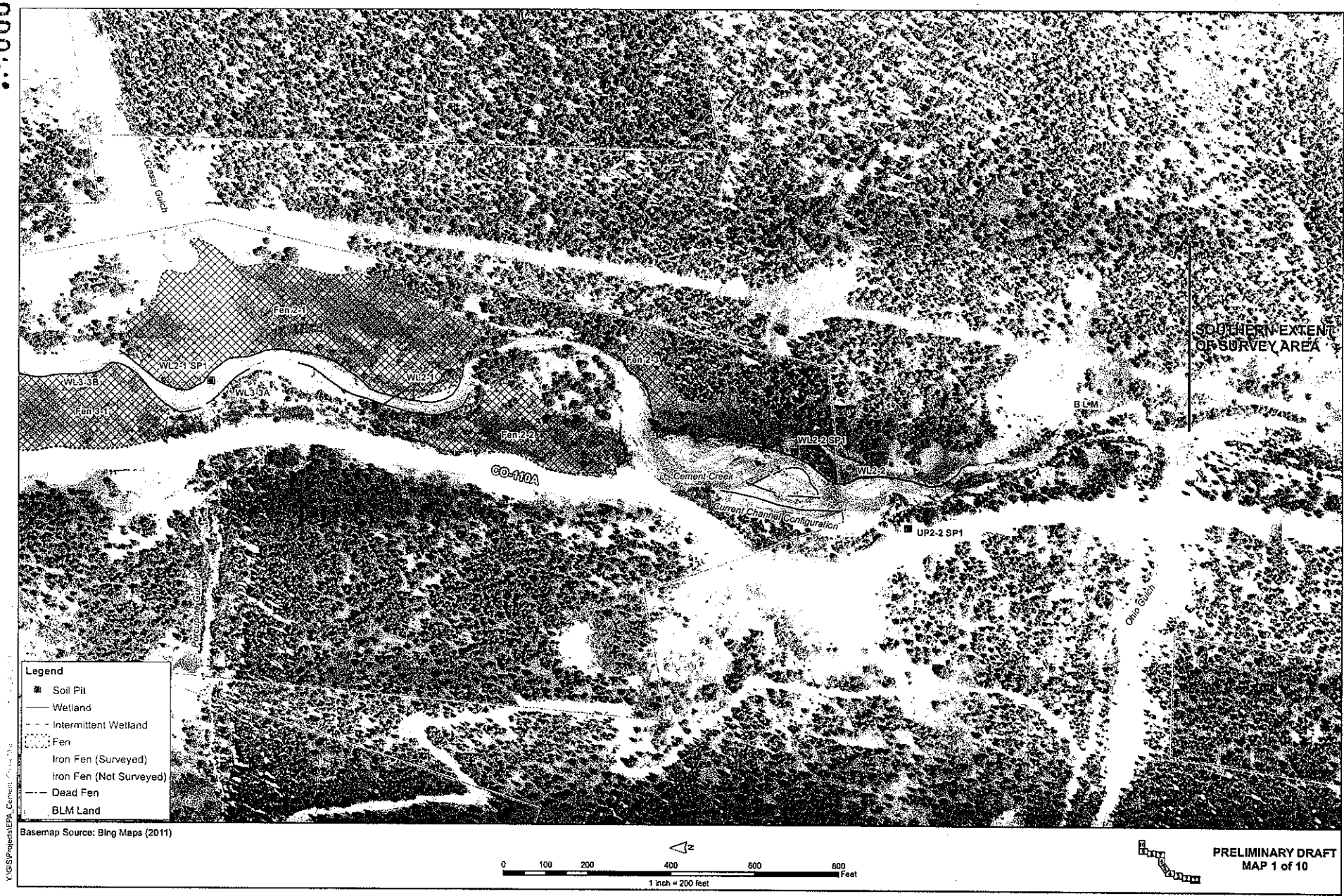


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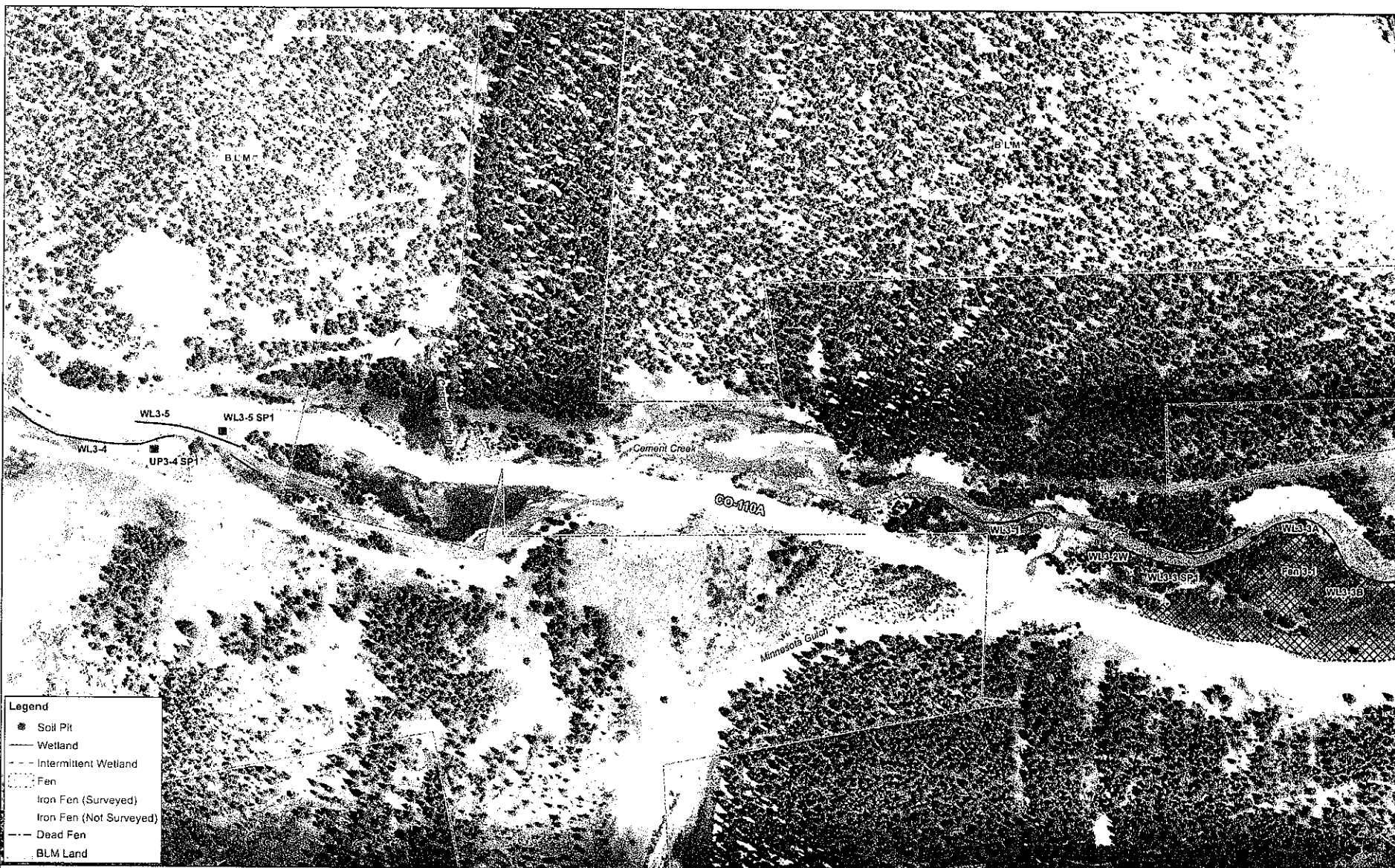
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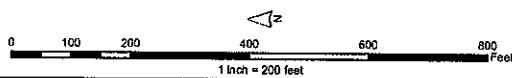


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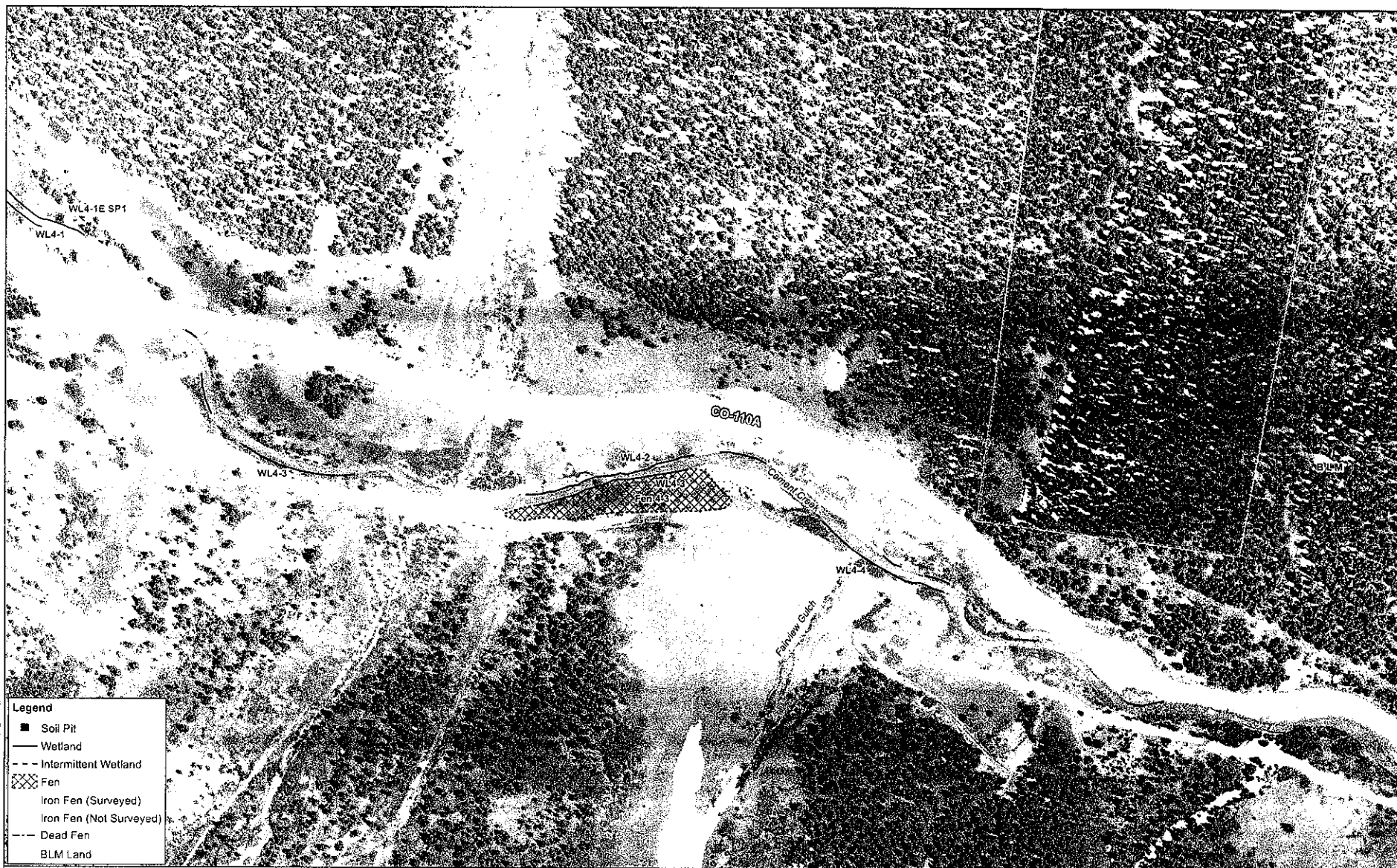
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Basemap Source: Bing Maps (2011)



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MAP 2 of 10

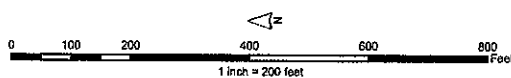


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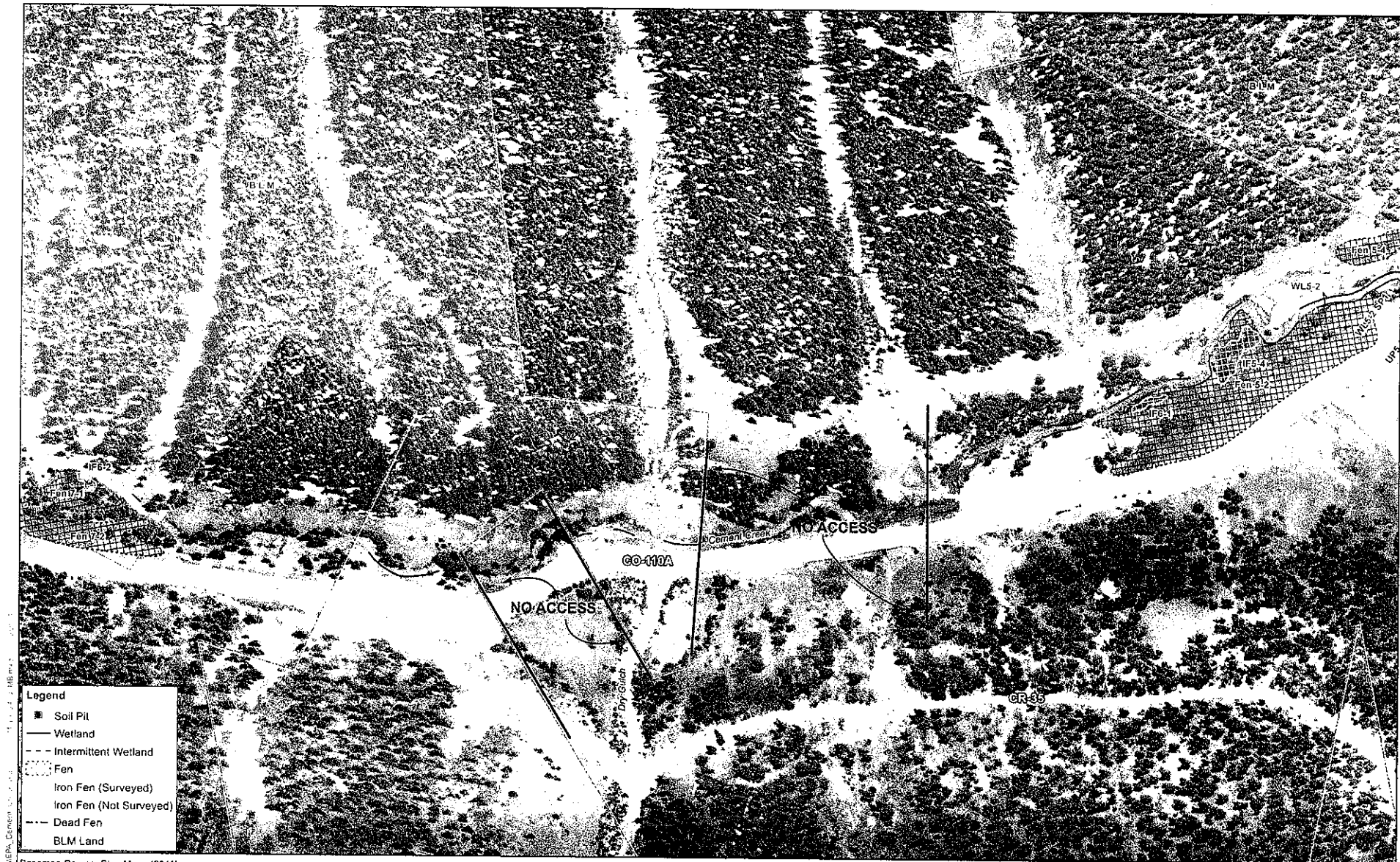
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 - ▨ Iron Fen (Surveyed)
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 - BLM Land

Basemap Source: Bing Maps (2011)



PRELIMINARY DRAFT
MAP 4 of 10

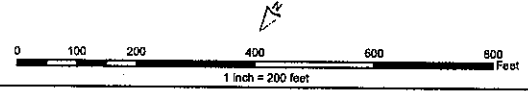
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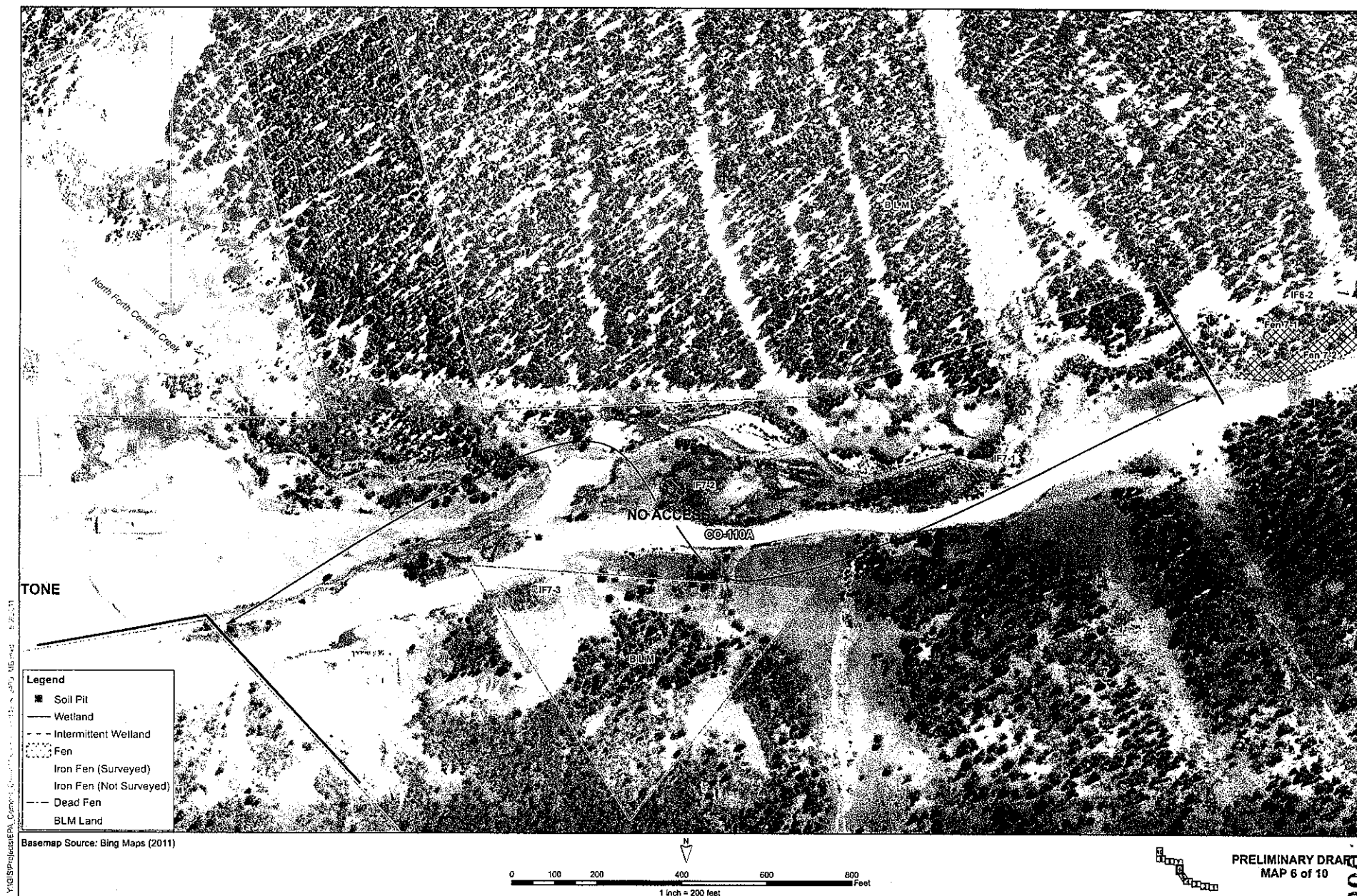
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- Fen
 - Iron Fen (Surveyed)
 - Iron Fen (Not Surveyed)
 - Dead Fen
- BLM Land

Basemap Source: Bing Maps (2011)



PRELIMINARY DRAFT
MAP 5 of 10

000050



000051

UPPER GOLD MINE
POINT SOURCE

UPPER GOLD MINE

ADAMS MINE

CR-52

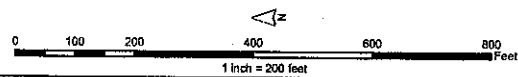
UP9 SP1

CO-10A

NO ACCESS

- Legend**
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 - ▨ Fen
 - ▨ Iron Fen (Surveyed)
 - ▨ Iron Fen (Not Surveyed)
 - - - Dead Fen
 - BLM Land

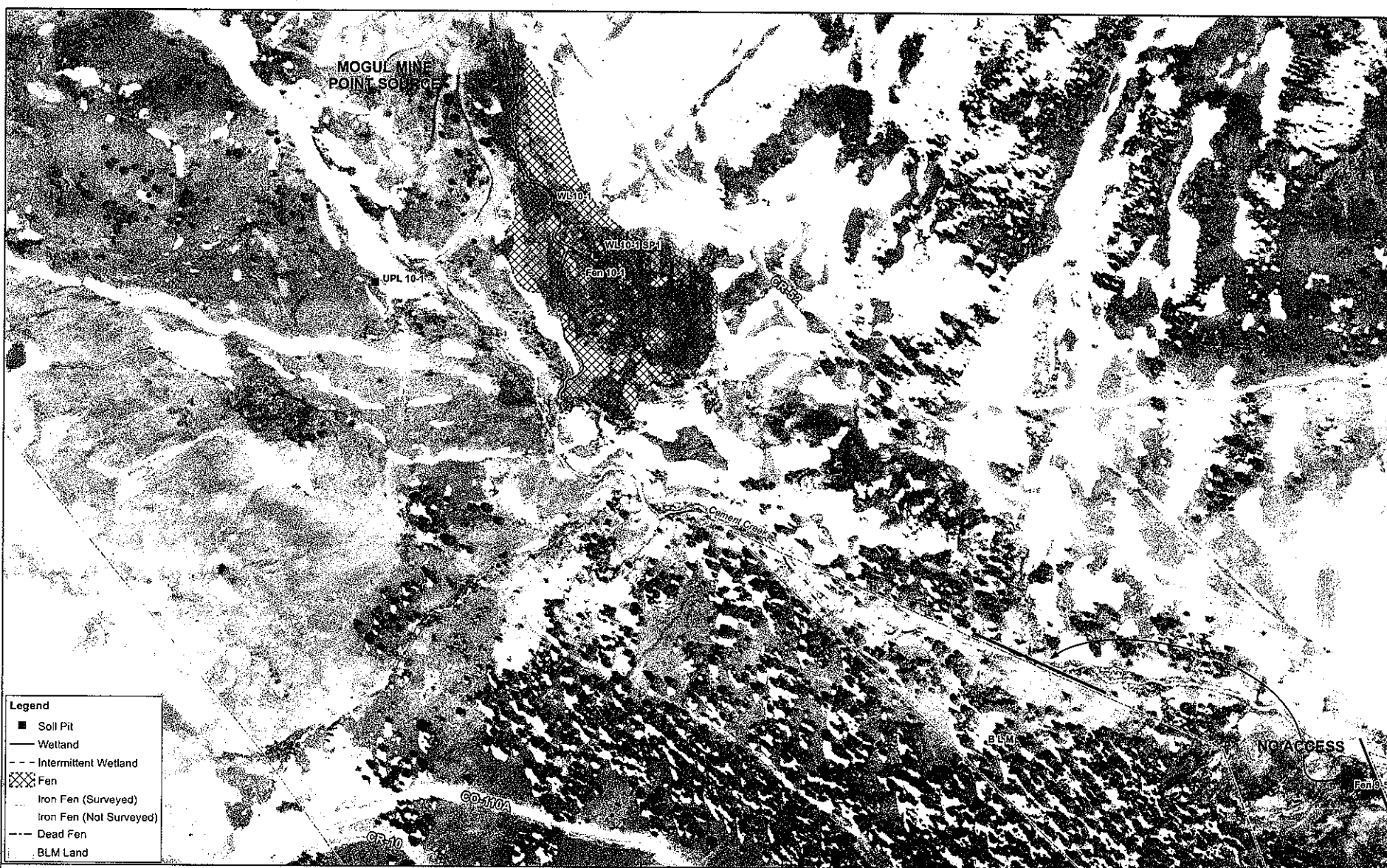
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PRELIMINARY DRAFT
MAP 8 of 10

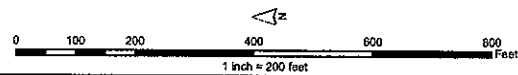
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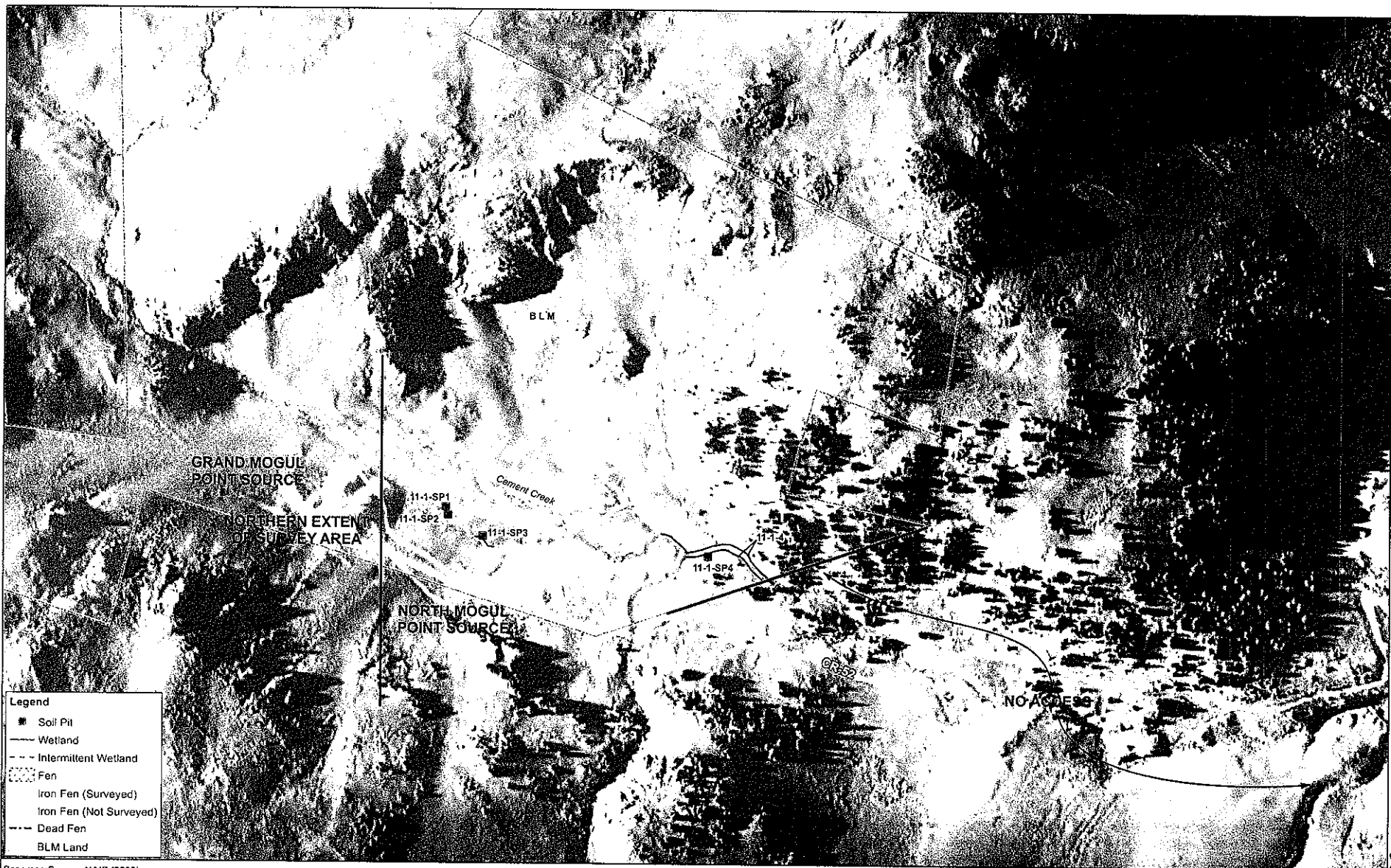
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 - Wetland
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 - ... Iron Fen (Surveyed)
 - ... Iron Fen (Not Surveyed)
 - - - Dead Fen
 - BLM Land

Basemap Source: Bing Maps (2011)



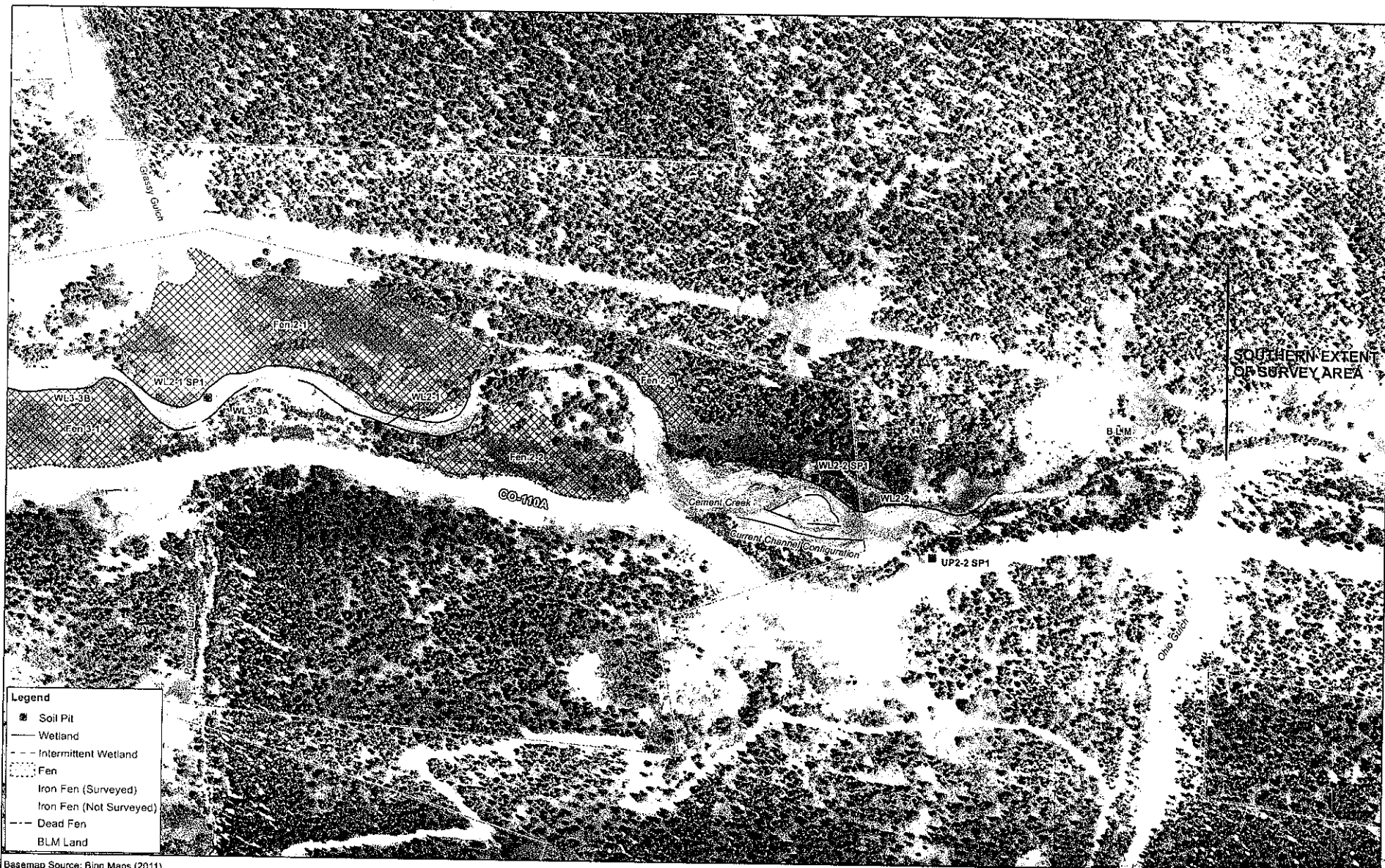
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MAP 9 of 10

000054



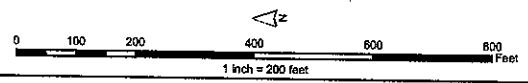
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000055



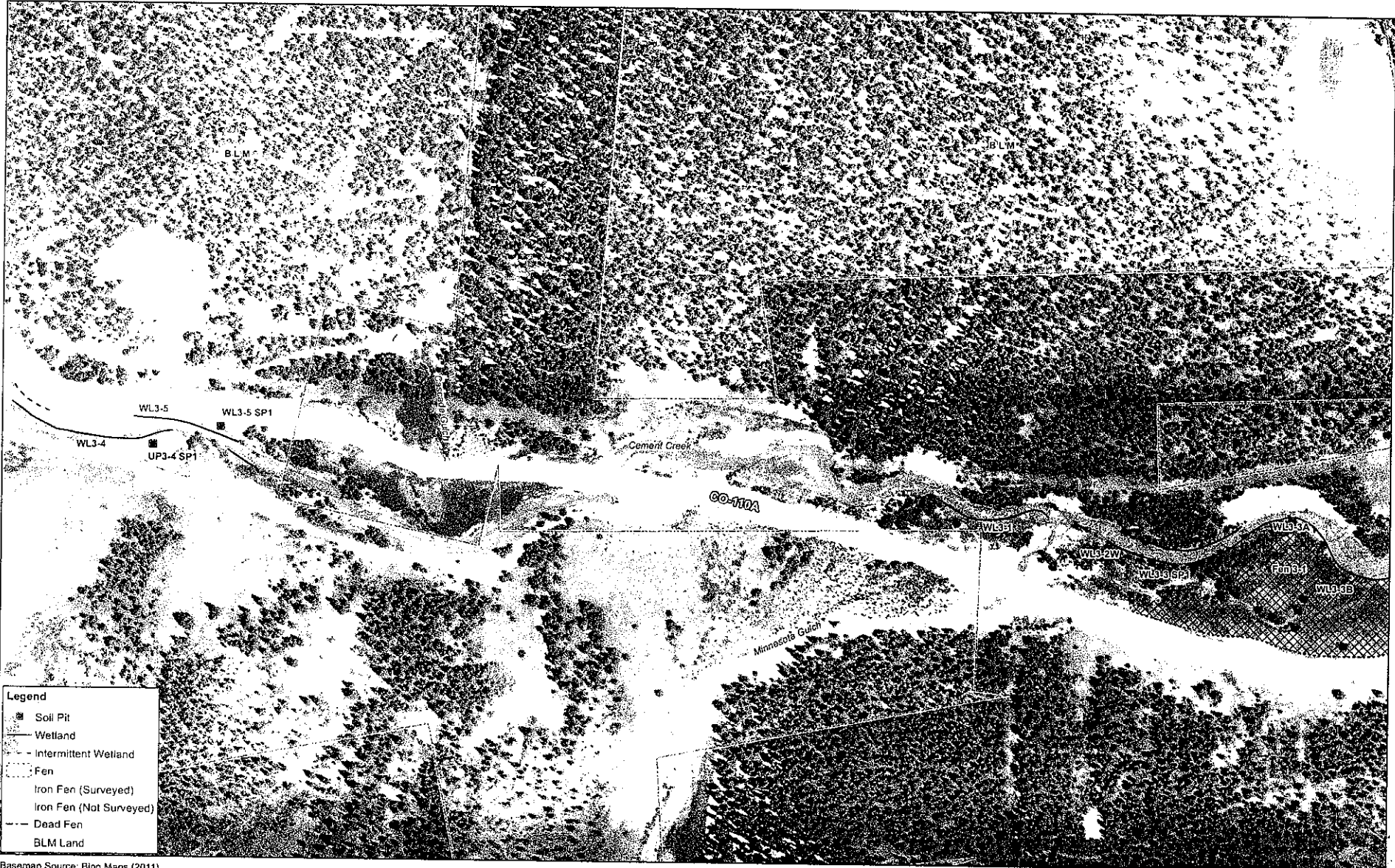
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- Soil Pit
 - Wetland
 - - - Intermittent Wetland
 - Fen
 - Iron Fen (Surveyed)
 - Iron Fen (Not Surveyed)
 - Dead Fen
 - BLM Land

Basemap Source: Bing Maps (2011)



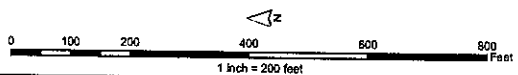
PRELIMINARY DRAFT
MAP 1 of 10

000056



- Legend**
- Soil Pit
 - Wetland
 - Intermittent Wetland
 - Fen
 - Iron Fen (Surveyed)
 - Iron Fen (Not Surveyed)
 - Dead Fen
 - BLM Land

Basemap Source: Bing Maps (2011)



PRELIMINARY DRAFT
MAP 2 of 10

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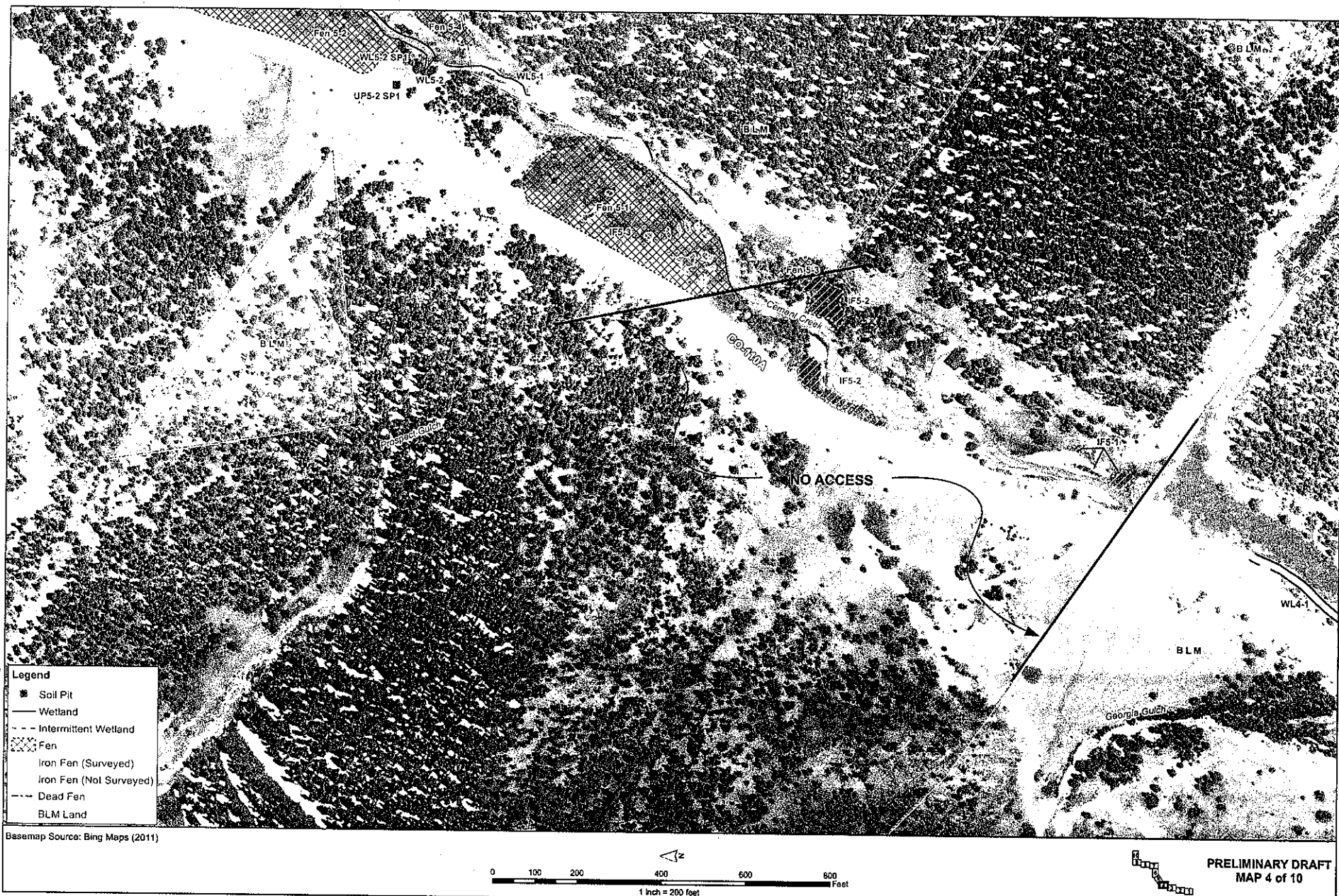
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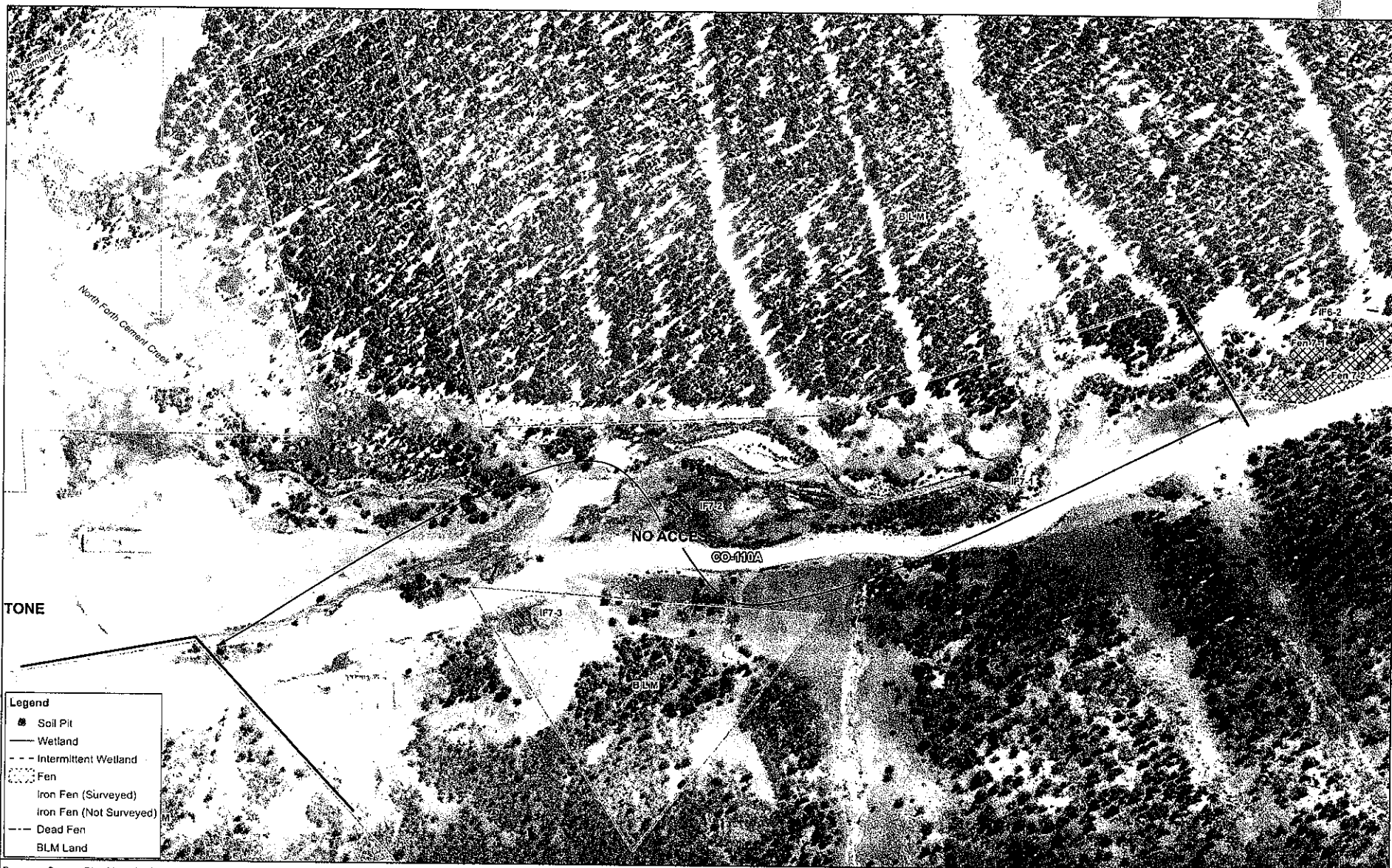
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MAP 3 of 10

000058

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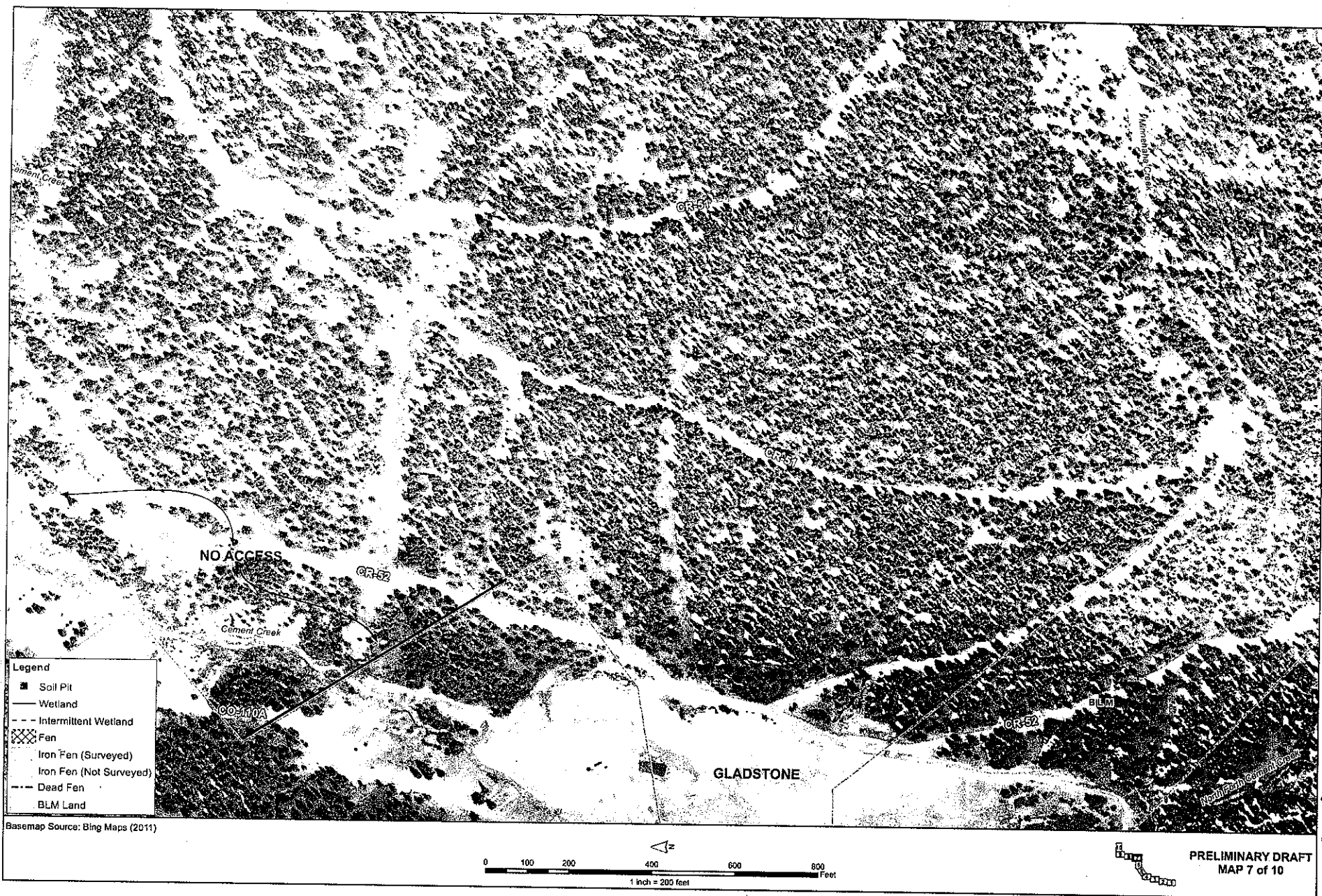


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000061

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000062

UPPER GOLD POND
POINT SOURCE

RED ANTONIO
MINE ROAD

ADAMS MINE

CR-52

UP6-SP1

WL9-1 SP1

WL9-1

CO-110A

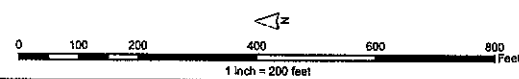
BLM

NO ACCESS

Legend

- Soil Pit
- Wetland
- - - Intermittent Wetland
- ▨ Fen
- ▨ Iron Fen (Surveyed)
- ▨ Iron Fen (Not Surveyed)
- - - Dead Fen
- BLM Land

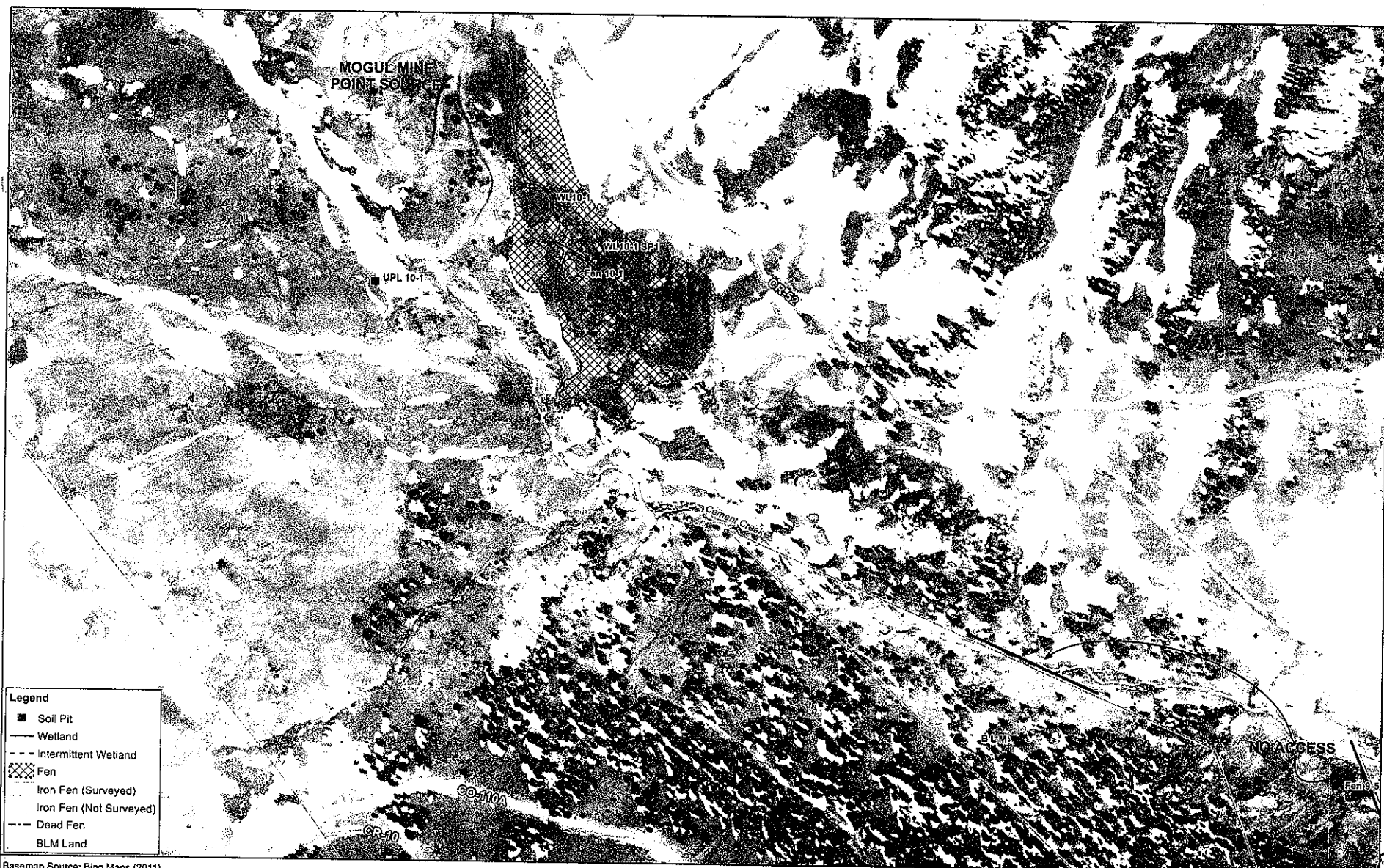
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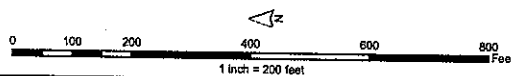
PRELIMINARY DRAFT
MAP 8 of 10

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Basemap Source: Bing Maps (2011)



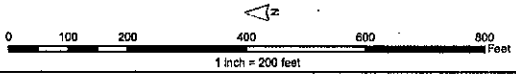
PRELIMINARY DRAFT
MAP 9 of 10

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790000



- Legend**
- Soil Pit
 - Wetland
 - - - Intermittent Wetland
 - ▨ Fen
 - ▨ Iron Fen (Surveyed)
 - ▨ Iron Fen (Not Surveyed)
 - - - Dead Fen
 - BLM Land

Basemap Source: USGS 7.5' Topographic Quadrangle



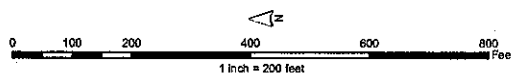
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MAP 1 of 10

YAGS/Project/SEPA

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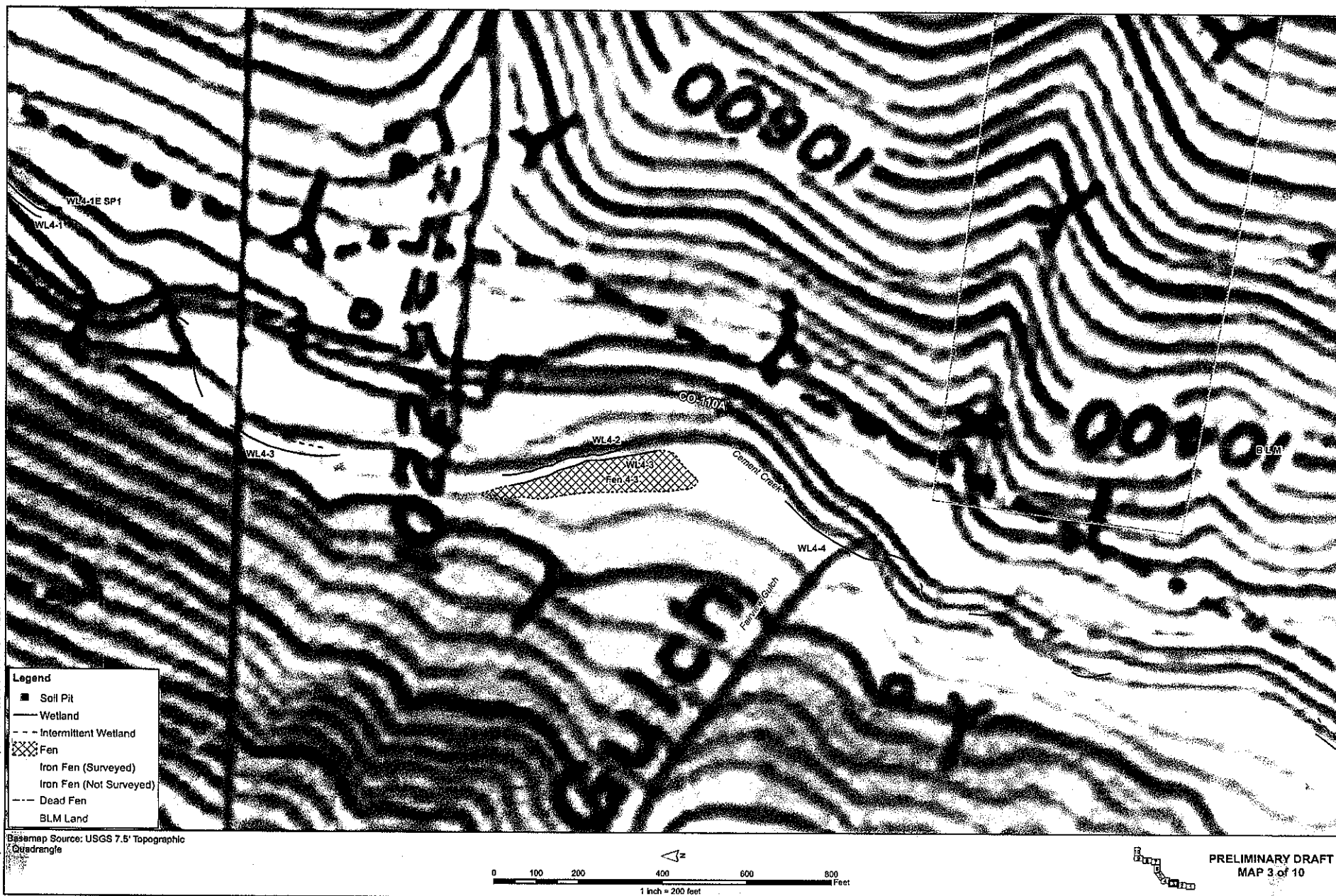


Base map Source: USGS 7.5' Topographic
Quadrangle

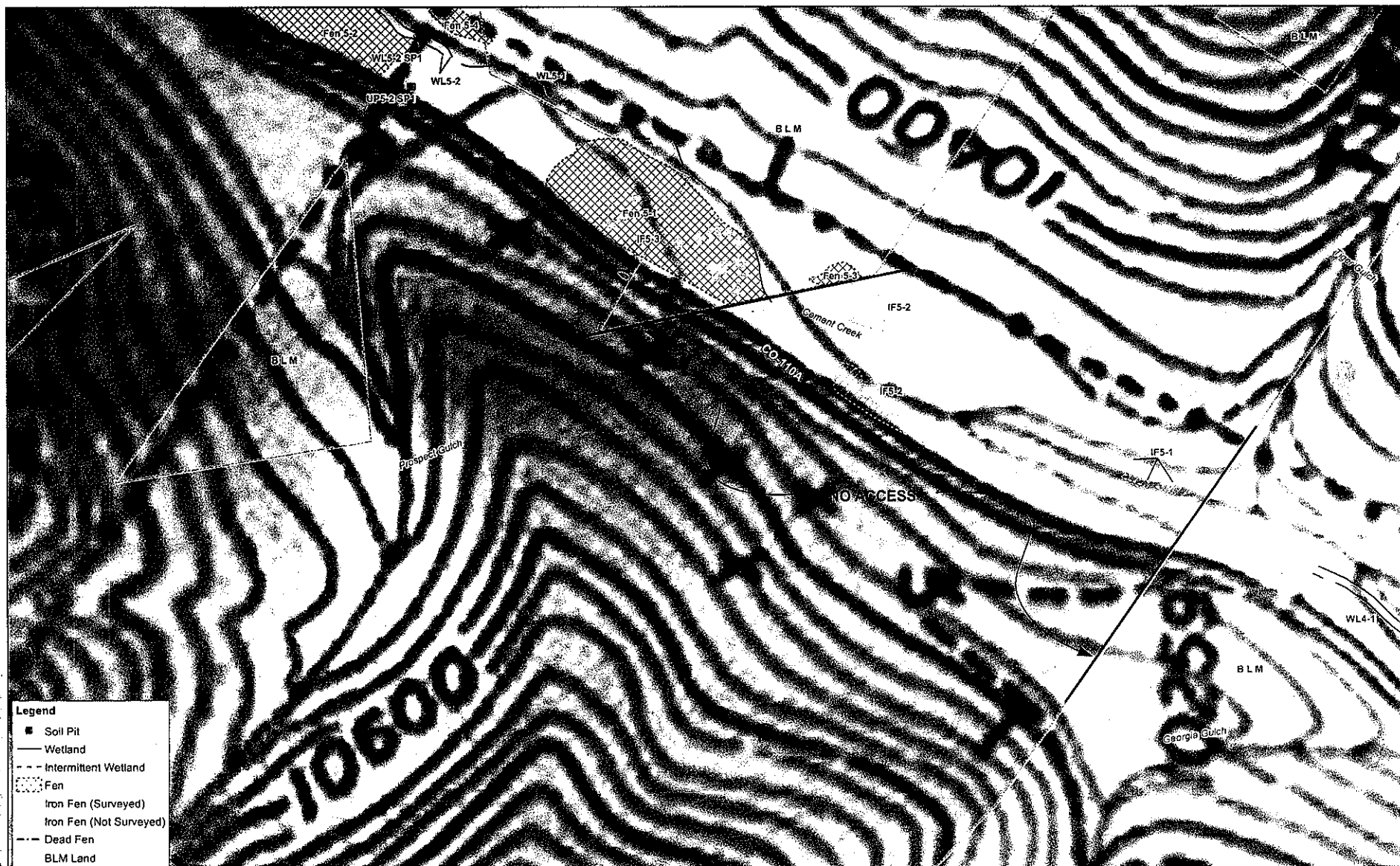


PRELIMINARY DRAFT
MAP 2 of 10

000067

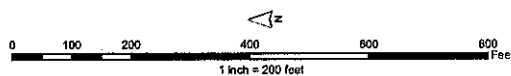


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- Legend**
- Soil Pit
 - Wetland
 - - - Intermittent Wetland
 - ▨ Fen
 - ▨ Iron Fen (Surveyed)
 - ▨ Iron Fen (Not Surveyed)
 - - - Dead Fen
 - BLM Land

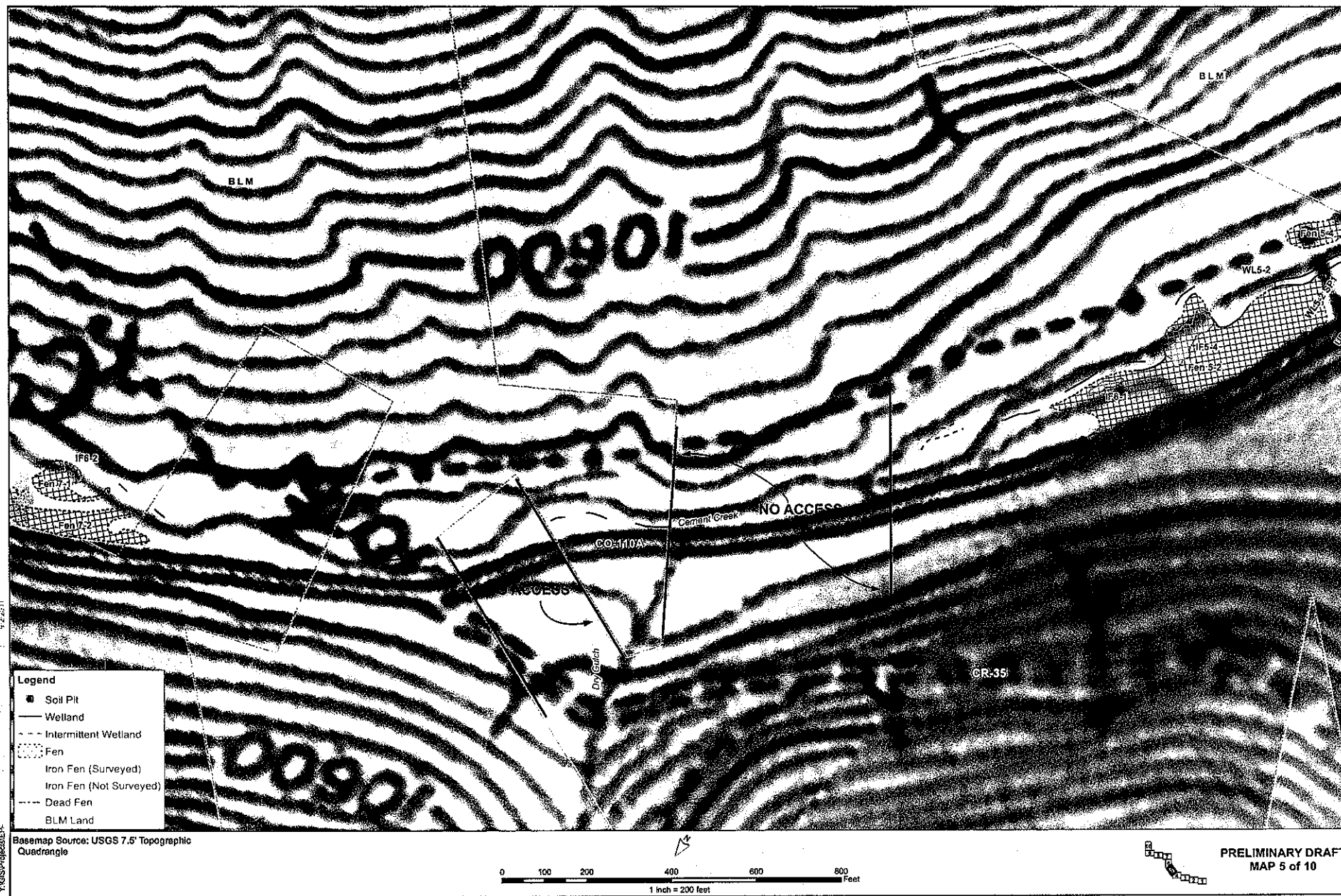
Basemap Source: USGS 7.5' Topographic
Quadrangle



PRELIMINARY DRAFT
MAP 4 of 10

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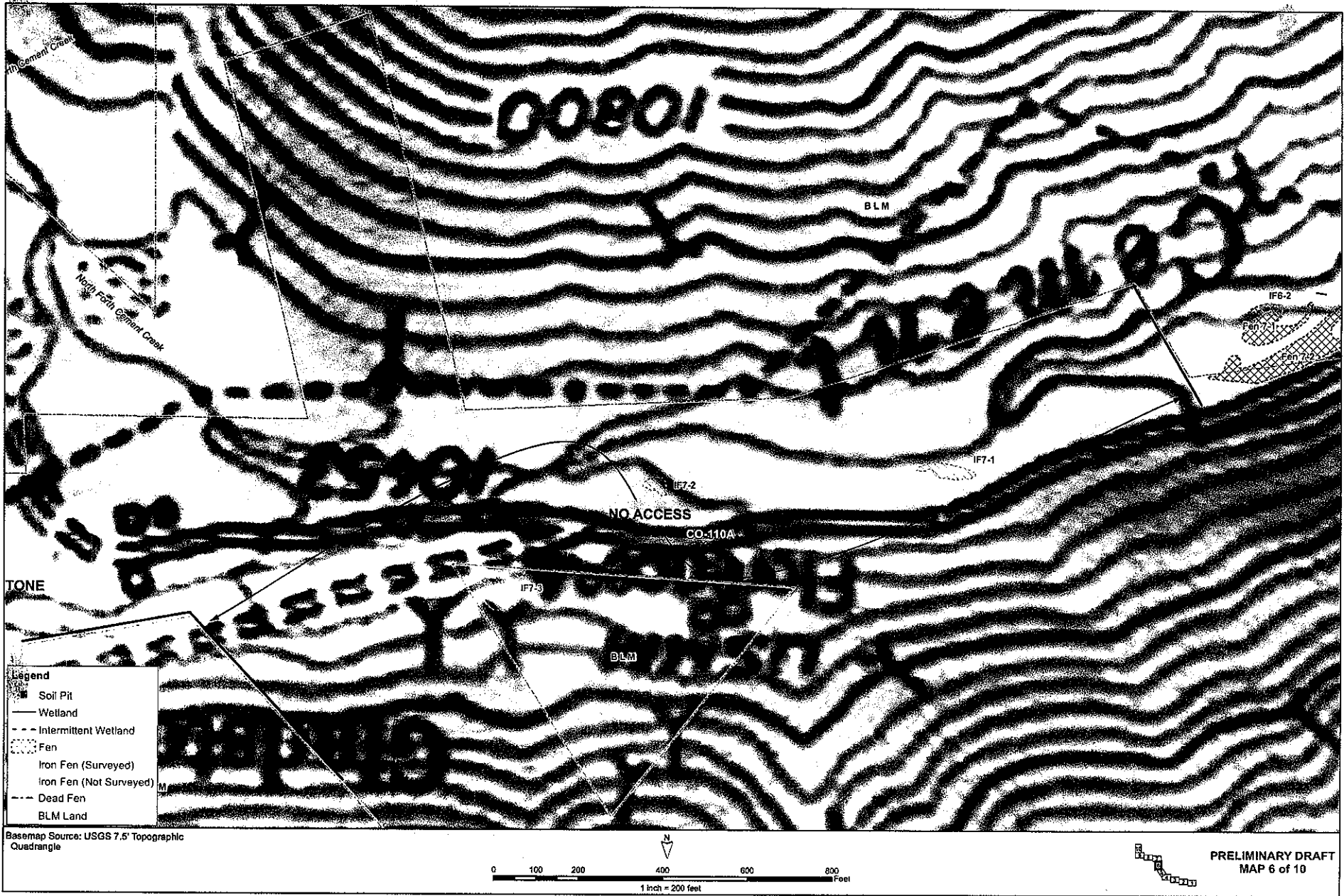
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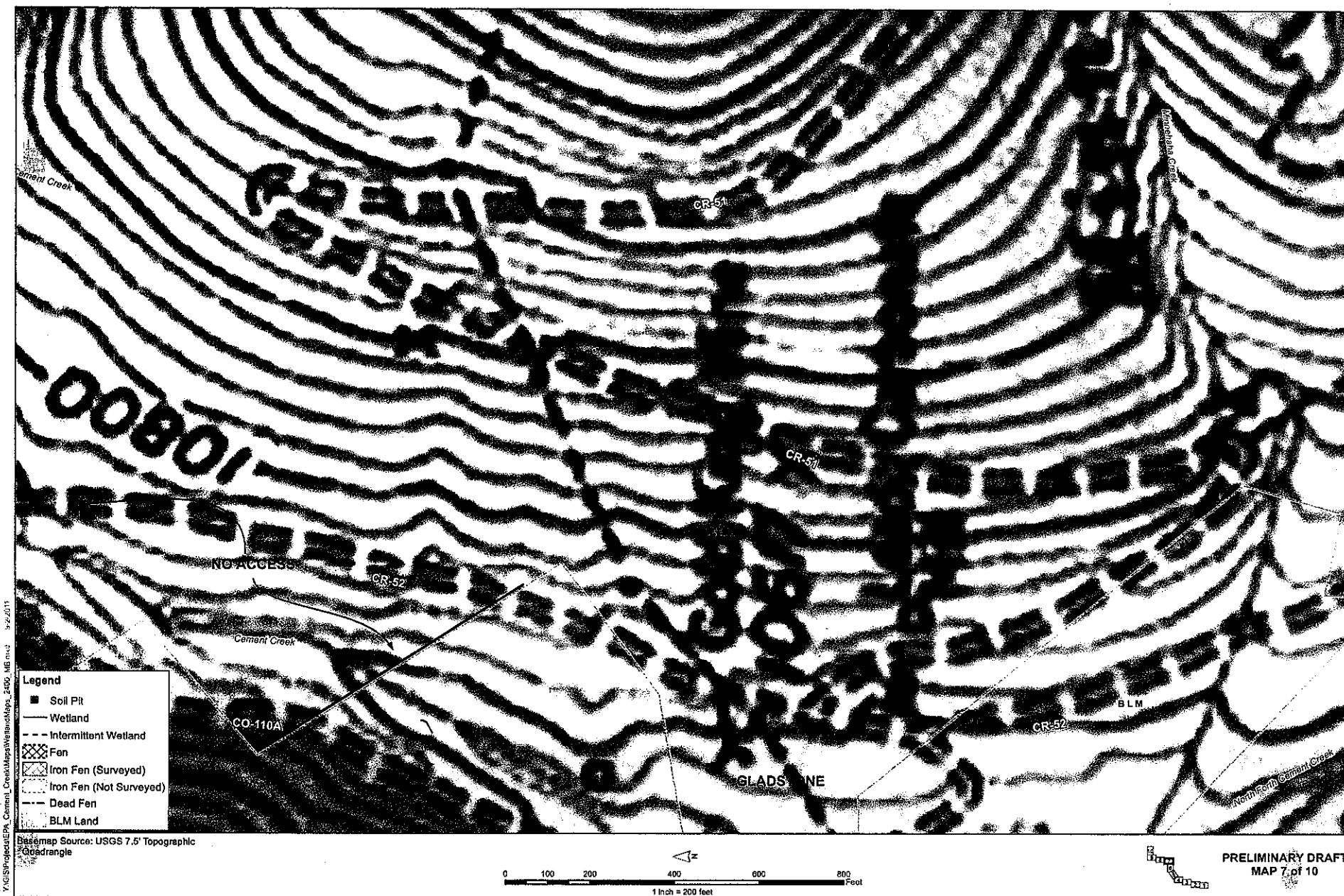


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4/26/11

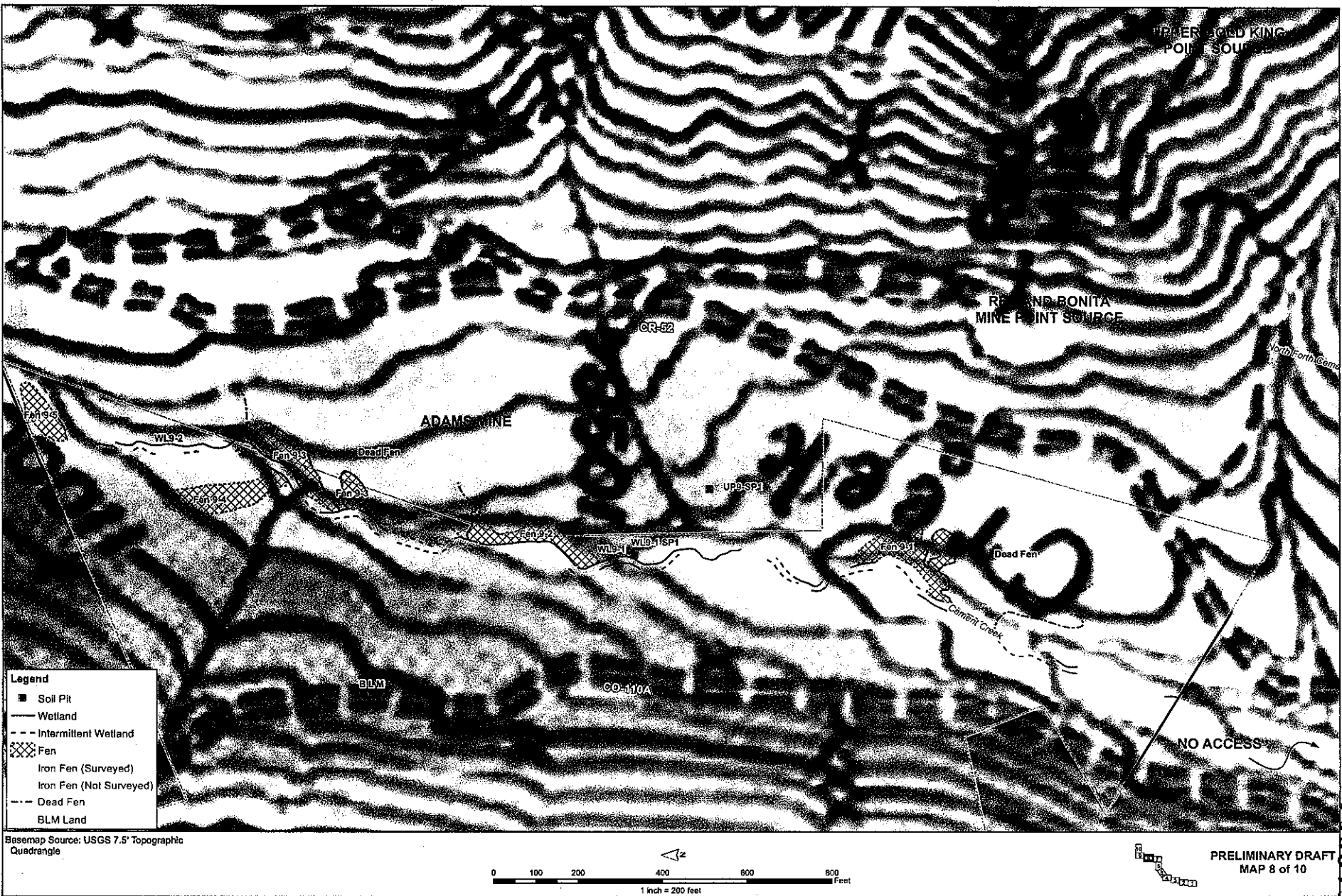
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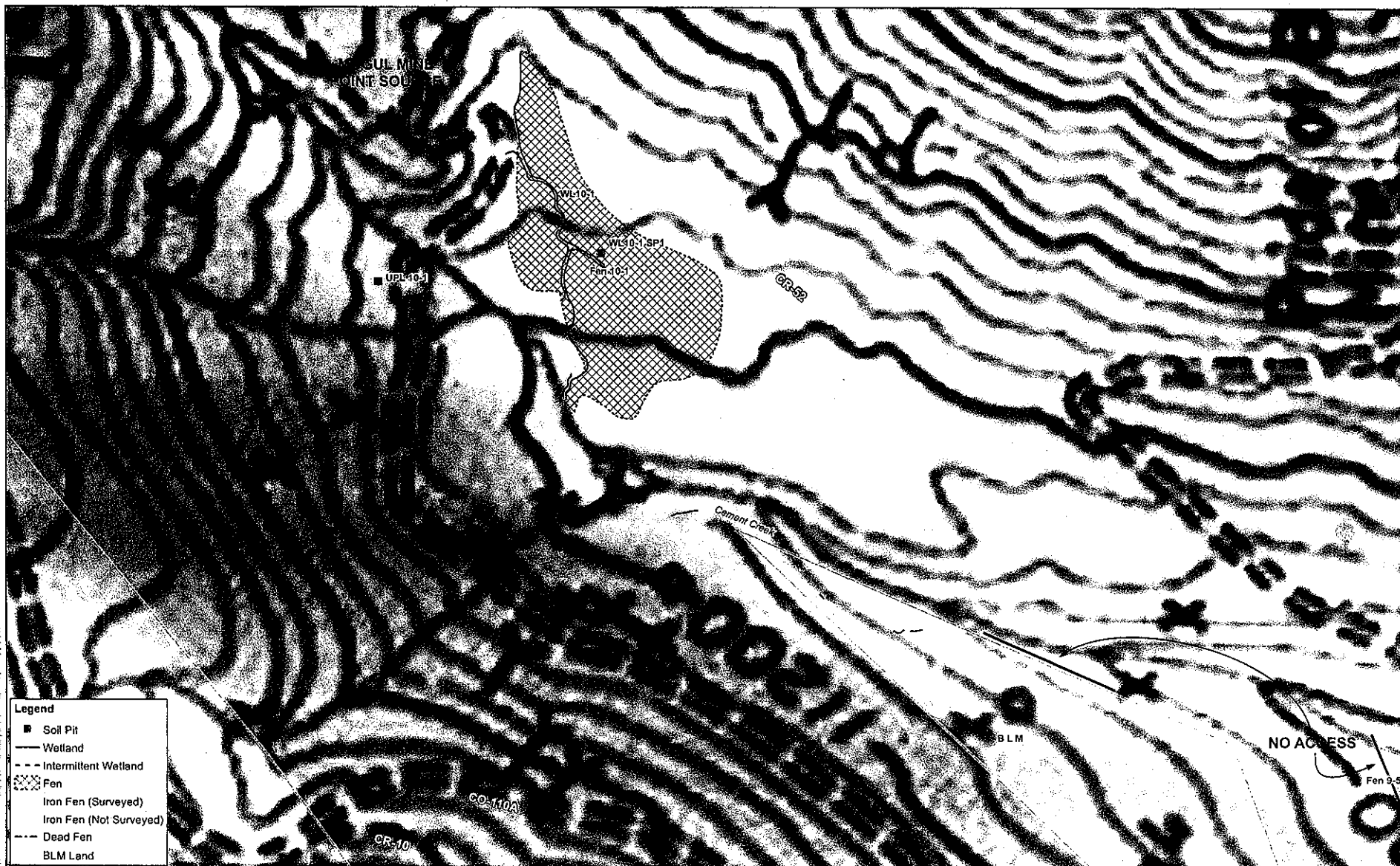
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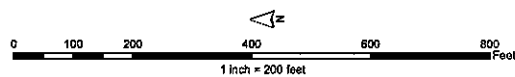
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Map's Metadata Map... 9/2/2011

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PRELIMINARY DRAFT
MAP 8 of 10



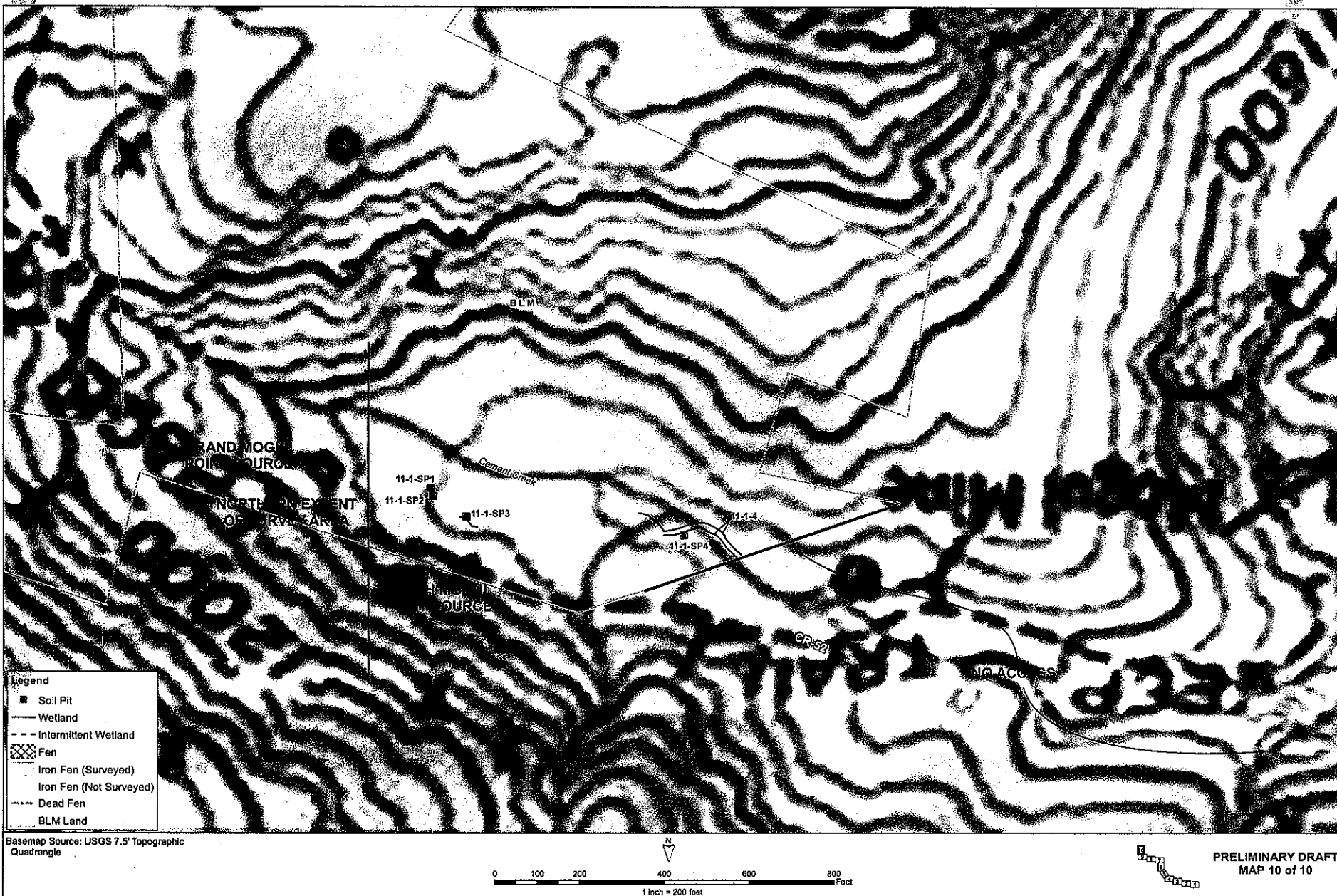
Basemap Source: USGS 7.5' Topographic
Quadrangle



PRELIMINARY DRAFT
MAP 9 of 10

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YGIS/ProjectEPA_Colomb_CreekMap/Voluntar... 9/2/2011



000075

000076

Appendix D
Project Field Logbook

B. Hayhurst

August 22, 2011

- 0700 Meet for orientation meeting.
- 0745 H/S meeting
B Hayhurst & Jeff Miller - sliptrip-falls-driving-lightening
- 0800 Arrive County Assessor's Office to search property records. Work with Dan Salazar
- 1000 Send list of property/claim owners via FAX to Sabrina Forrest.
- 1030 Arrive Mogul complex. Examine geology and mine containment.
Quartz-sericite association.
Iron staining in waters
wetlands in vicinity.
- 1500 Explain potential issues in wetland delineation to Susan Hall
- 1535 lunch break and return calls to Sabrina Forrest
- 1600 Arrive Moras Lake campground to get permission to hike to Elk Park. Parking and access OK.
- 1630 Return to cement creek to look at Red & Bonita and Gold King 7 Level Mines
- 1730 Hike up to Gold King 7 Level Mine
Observe pile, run-on, Run-off controls, Jolum stream, observed release at base of pile.
- 1900 Return to Silverton.

Bm

B. Hayhurst

August 23, 2011

0700 Meet for early Am meeting

B. Hayhurst, J. Miller, S. Hall, Jeff Dawson

0705 Answer Sabrina's calls

0710 Call office

0730 Meet with Susannah and Jeff Dawson

Gave them Sabrina's tele #s in case of emergency

0830 Call Sabrina about taking extra samples
from waste pile at Gold King 7 level waste pile

0900 Drive to Molas lake

Weather clear, cool, no real wind

Task - hike down to Elk Park to document
fishery use

0900 H.S. meeting B. Hayhurst & J. Miller

slip-trips-falls, sunscreen, water hazard
aggressive individuals, wildlife, drinking & food.
Rain gear, first aid training, no cell phone
avoid cliff edges, be aware of surroundings when
taking photos.

0920 Begin hiking down to Elk Park

1130 Arrive at Elk Park

Begin searching for fishermen and evidence
of fishing. Moving southward along east
bank of river. Flow rapid, islands, but
no pools to invite fishing. Iron Stewage

S. H. H. H.

August 23, 2011

on rocks within annual high flow limit.

11:40 Train passes en route to Silverton

11:48 Second train passes en route to Silverton

12:20 Arrive at south end of Elk Park

Talk to four young boys working on railroad as a crew. They say people take the train up to go fishing, but the people usually fish from the south end of Elk Park downstream to Needleton - The water in Elk park is too swift for fishing. Talk to a camper who also echoes this information.

12:30 Find a fishing lure/hook in a tree - take a photograph.

1300 Retrace steps northward towards Silverton past Colorado Trail bridge - no evidence of fishermen, no evidence of casual fishing.

1330 Hike from Elk Park to Mokes Lake.

1600 Drive to Silverton

1620 Check in Outdoor shops for leads to document fishing on Animas River

1700 Stop for DAY

~~for~~

* B. Hayhurst ✓

August 24, 2011

0700 Meet with URS delwinton crew

They have additional properties that they
would like access to. We will check
at courthouse after 8:00 Am

0745 Call Office and Sabrina Forrest.

0800 Arrive at Accessors Office

Talk to Don Salazar

Claims below Mogul Mine in Wetland are
largely owned by San Juan Minerals and
Salem minerals. (aka Todd Hewitt)

Rob the Renter, Yingo, Theresa, Gold Point
Henry M. Teller, Golden Eagle.

Lucky Jim and Ajax owned by Kees McGee corp
P.O. Box 268859

Oklahoma City, OK 73126

0900 H: Smeety. B. Hayhurst & Jeff Miller

down safety / sunscreen / bug / slip trips - falls
Weather clear partially cloudy

0930 Meet with delineators about access issues

1000 Arrive at Red 1 Bonita Mine to define PPE.

1100 Take photos of R&B mine - top, flow out, view
to west. Photos of PPE into cement creek.

Flow division clear vs stain. Flow under
road into sedgey area. No plant growth

B. Hager

Aug 24, 2011

stream divides, main flow north & $\frac{1}{3}$ flow south.
 photos of PPE

1200 wait at Silverton train station to interview
 train staff about letting off people at Elk Park

San Juan ~~State~~ Backcountry
 Land Office

Geologic Atlas — "Economic Geology"

Silverton Folio

1905

upper Potosi volcanic series

flows tufts of qtz, biotite, chlorite

lower Silverton volcanic series

andesite, Nephelite

1330 Frank Ciani - Conductor Durango Silverton RR.

21 years - one drop-off (family) - fishing

Seen fisherman 5 or 6 times.

1400 Ron Dewitz - volunteer with Forest Service @ ^{Public} Land Center
 no known tourist fishing activity

occasional hear of someone catching on Animas south of town
 "Wyatt" Judge Skinner - Melanie - dispatcher @ sheriff's office

1500 Locate American Tunnel outlet to Cement Creek
 and photograph.

1545 Locate Gold King Level PPE to Cement Creek and photograph

1615 Locate Mogul outlet to Cement Creek (PPE) and photograph

1700 Return to Silverton.

B. Hegner

August 25, 2011

0700 Meet with URS delineation team.

Pick-up GPS unit and pass on information about access at Mogul wetlands and lack of access at Gladstone.

URS anticipates leaving Sunday mid-day.

Call Sabrina about access to sphagnum moss area.

TASKS For Thursday: 1) GPS PPE's ~~to~~ to Cement Creek for

- 1) Grand Mogul Mine
- 2) Mogul mine
- 3) Gold King 7 level Mine
- 4) Red & Bonita Mine
- 5) American Tunnel

2) Collect samples from Gold King 7 Level Mine and determine dimensions of waste pile

0800 Weather - cool, clear, with clouds to south

0900 Talk to Sabrina Forrest about access around Mogul mine and Gladstone. We have access to wetlands below Mogul and along creek at Gladstone - to look for sphagnum moss

0915 Tell URS delineation crew about access

0930 H&S meeting. B. Hegner & J. Miller

Thunder lightning, nails, sweeney, slip trix falls

R. H. Hughes

August 25, 2011

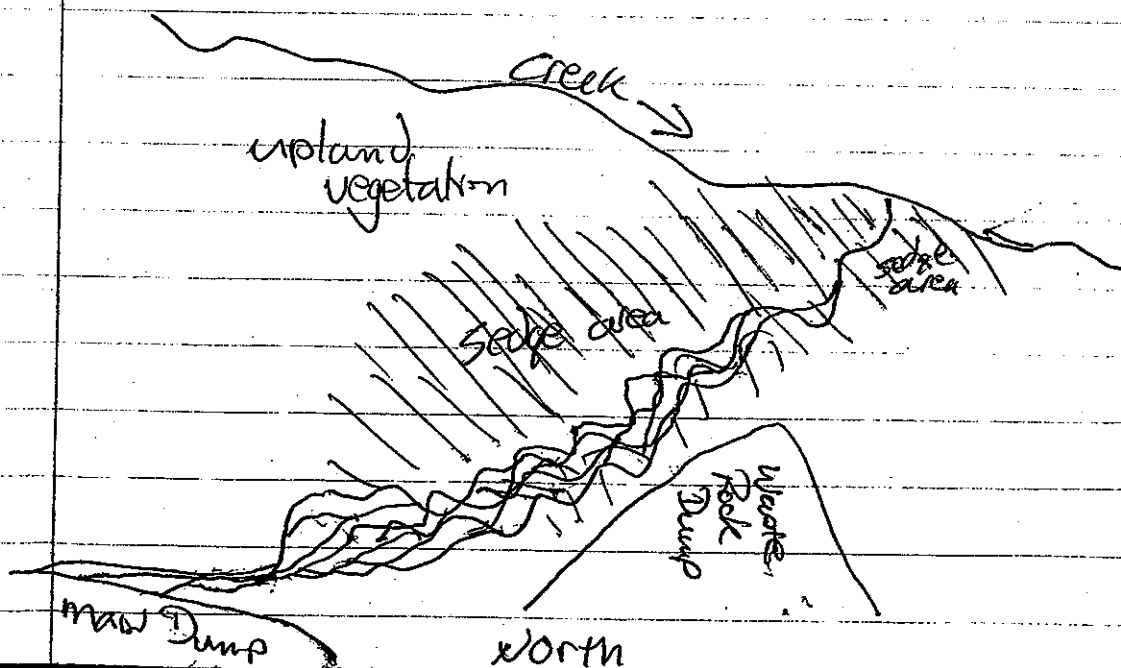
0935 Leave for Grand Mogul.

1000 Take GPS & PPE of Grand Mogul into creek. Note precipitation of iron at PPE. At in meadow stream Area vegetated by sedge (golden colored vegetation). Area previously identified as wetland based upon vegetation, however hydrophilic soils not present

1015 Mineralogy noted in mine dump. Quartz-pyrite association - milky quartz with veins and fracture coatings of poorly formed pyrite crystals.

Mineral Assemblage - quartz with pyritic veins. Country rock of volcanic with Fe oxide iron staining. Fine grained material is mineralized and altered quartz, feldspar with limonite staining

Sketch of Drainage from Grand Mogul



B. H. H. v

August 25, 2011

Magul Mwe

11:00 Photo of adit with adit discharge. Geotextile fabric for about 50 ft. Some leakage to waste rock pile on eastern (mountain) side (Photo). Geotextile fabric absent from flow path (photos). Flows over mix of waste rock, lumber, and natural colluvium. Flows across surface of road down drainage into wetlands below Magul Mwe (photos).

Mineralogy: Quartz (milky) and pyritic veins present, but on smaller scale. Waste rock seems to be more altered with limonite staining.

Photo of PPE from Magul into creek staining of rocks.

11:50 Pile of waste rock (angular fresh quartz-pyritic vein material and freshly broken country rock) dumped off side of road into wetland. Flow of wetland stream along front of waste pile.

12:15 Move to Red's Barite PPE's.

PPE-1 most upstream $\approx \frac{2}{3}$ of flow

PPE-2 downstream $\approx \frac{1}{3}$ flow

The waste rock pile is covered by an armoring patina of ferric oxides scattered pieces of waste rock found about the site.

P. H. H. H.

August 25, 2011

include The quartz-pyritic veined material
1350 Move to Gold King 7 Level Mine PPEs
into Cement Creek.

PPE01 upstream $\pm 1/4$ PPE02 downstream $\pm 3/4$

Photos of PPEs into Cement Creek

1410 Move to American Tunnel PPE.

Photos of PPE.

1430 Break for lunch a telephone message check

1500 Call Sabrina - check in

1600 Arrive at Gold King 7 Level Mine dump.

Innov-X ~~100~~ Systems

Model OSBD-4000 # 70047

Standard 316

cps - 64081

Resolution 148 c/b/b

XRF Field in Situ shots

#	Pb	As	Cd	Time	Desc
1	734	33	<37	1620	med grain (un2)
2	977	57	<29	1627	" "
3	2980	168	<29	1631	fine grain yellow
4	2952	166	<30	1635	" " "
5	684	28	<24	1639	mixed
7	4520	175	<26	1640	fine grain yellow
8	458	40	<29	1650	white, med g
9	474	34	<40	1652	" " "

9/25/11

Calculations for Value of Gold King 7 Level Mine

Adit (small)

larger bit

Unidirectional flow

FLUID

↑ 10A

-100H. estimates \Rightarrow

Road

Q. 1150016

WAS0017
⊗

slow

WASOOR

waterfalls to N. FK C. CR

0018
N. Fork Cement Ck

WASOOTS

- Estimate across top 100 ft.
- Estimate across bottom 220 ft.
- Estimated height 70 ft.
- Estimated (with Brankin) slope 32%

7

G. H. H. H.

8/25/11 000087

11

#	Pb	As	Cd	Time	Descr
10	173	68	< 30	1730	Poorly sorted Red
11	626	47	< 24	1735	yellow, ^{fy}
12	665	50	< 25	1740	Duplicate

1735 Take a presumed background

1735 1446 51 < 27 1735 Brown, mixed
Complete field XRF

The ^{Part}tearings/waste rock in the dump can be divided in three rough groupings.

AKC.CK

1 - a medium to coarse grained, well sorted orange limonite stained material with lead < 1,000 ppm and arsenic < 100 ppm

2 - a medium to fine grained limonite stained material with lead between 2,000 and 4,000 ppm and arsenic \geq 100 ppm.

3 - a medium to coarse poorly sorted quartz-white with sulphides (pyrite), Pb < 500 ppm, As < 50 ppm

At.

Will collect a sample of each of these three characteristic waste rock types plus a 4th sample of the #2 type where it is being actively eroded by the stream.

32%

1750 Collect sample UAS015 from toe of (GK7LS01) Gold King 7 Level waste rock dump where the medium to coarse grained limonite stained material is

C. Huger

August 26/2016

000088

being actively eroded by the N. Fork of
Cement Creek. See Photos

1805 Collect waste rock sample UAS0016 (GK7LS02)
from medium grained material - See Photo

1815 Collect waste rock sample UAS0017 (GK7LS03)
from limonite stained material

1830 Collect waste rock sample UAS0018 (GK7LS04)
from quartz (white) sulfide material

1915 Leave Gold King 7 Level mine dump

2000 Arrive Silverton

B. Hayner

Aug 26, 2011

0700 Meet with US delegation - review work and schedule - no problems, should be finished by late Saturday

0730 H:S Meeting - B. Hayner, J. Miller
slip trips - fall, weather, driving safety and
River awareness while looking for fisherman

0800 Check by Animas River below Silverton
for evidence of fishermen or fishing - no
observed

1400 Redhead Animas River below Silverton
for evidence of fishing activity - none observed

1500 Depart Silverton for Denver.